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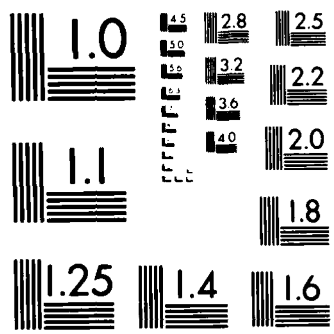

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INSTALLATION RESTORATION PROGRAM
PHASE I: RECORDS SEARCH
NEW BOSTON AIR FORCE STATION, NEW HAMPSHIRE

FINAL REPORT

PREPARED FOR
DEPARTMENT OF THE AIR FORCE
HQ SPACE DIVISION (DEV)
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JULY 1985

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This report has been prepared for the U.S. Air Force by Environmental Science and Engineering, Inc., for the purpose of aiding in the implementation of the Air Force Installation Restoration Program. It is not an endorsement of any product. The views expressed herein are those of the contractor and do not necessarily reflect the official views of the publishing agency, the U.S. Air Force, or the Department of Defense.

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PREFACE

The Installation Restoration Program Phase I: Records Search, New Boston Air Force Station, New Hampshire was prepared by Environmental Science and Engineering, Inc., Gainesville, Florida.

It describes the installation missions, environment including geology and hydrology, findings of the records search for past hazardous material disposal sites, conclusions and recommendations. It will be used to identify and control the migration of hazardous contaminants, and to control hazards to health or welfare that may result from past disposal practices.

This work was initiated in September, 1984 and was completed in July, 1985. Mr. John R. Edwards, Headquarters Space Division was the Project Manager.

This report has been reviewed by the office of Public Affairs (PA) and is releasable to the National Technical Information Service (NTIS). At the NTIS, it will be available to the general public, including foreign nations.

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20. ABSTRACT (Continue on reverse side if necessary and identify by block number)
An Installation Restoration Program Phase I Records Search was conducted of New Boston Air Force Station from Feb. 11 to Feb. 15, 1985. Past and current employees were interviewed, records were reviewed, regulatory agencies were contacted, and a ground reconnaissance was conducted. Past waste handling and disposal practices were evaluated, and twelve past waste disposal or spill sites were identified. The sites were evaluated for potential for contamination and migration of contaminants using a decision tree process. Nine sites were found to have no potential for residual contamination and/or

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20. ABSTRACT (Continued)

contaminant migration and were deleted from further consideration. Three sites were found to have a potential for contaminant migration and were assessed using the Hazard Assessment Rating Methodology (HARM), and Phase II confirmatory sampling and analysis programs are recommended for these sites. In addition, actions for five disposal sites are recommended for inclusion in the Base Environmental Program.

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INSTALLATION RESTORATION PROGRAM

PHASE I: RECORDS SEARCH

NEW BOSTON AIR FORCE STATION, NEW HAMPSHIRE

Prepared for:

UNITED STATES AIR FORCE
HQ SD/DEV
Los Angeles AFS, California

Submitted by:

ENVIRONMENTAL SCIENCE AND ENGINEERING, INC.
Gainesville, Florida

July 1985

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1.0 INTRODUCTION

1.1 BACKGROUND

Due to its primary mission, the U.S. Air Force (USAF) has long been engaged in operations dealing with toxic and hazardous materials. Federal, state, and local governments have developed strict regulations requiring disposers to identify the locations and contents of disposal sites and take action to eliminate the hazards in an environmentally responsible manner. The primary Federal legislation governing disposal of hazardous waste is the Resource Conservation and Recovery Act (RCRA) of 1976, as amended. Under Sec. 6003 of the Act, Federal agencies are directed to assist the U.S. Environmental Protection Agency (EPA), and under Sec. 3012, state agencies are required to inventory past disposal sites and make the information available to the requesting agencies. To assure compliance with these hazardous waste regulations, the Department of Defense (DOD) developed the Installation Restoration Program (IRP). The current DOD IRP policy is contained in Defense Environmental Quality Program Policy Memorandum (DEQPPM) 81-5, dated Dec. 11, 1981, and implemented by USAF message dated Jan. 21, 1982. DEQPPM 81-5 reissued and amplified all previous directives and memoranda on the IRP. DOD policy is to identify and fully evaluate suspected problems associated with past waste disposal practices and to control hazards to health and welfare that resulted from these past operations. The IRP will be the basis for response actions on USAF installations under the provisions of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980, as clarified by Executive Order 12316. CERCLA is the primary Federal legislation governing remedial action at the past hazardous waste disposal sites.

Site Nos. 2 and 3: Joe English Pond and Landfill No. 1	Sample surface water quarterly at JEP; analyze for explosives, metals, volatile organics, and extractable organics. Install 1 well upgradient of both JEP and LF-1, 2 wells between LF-1 and JEP at the edge of LF-1, install 1 well downgradient of JEP in the drainage course of Joe English Brook. Analyze LF-1 wells for total organic halogens, petroleum hydrocarbons, total organic carbon, and metals. Analyze the well downgradient of JEP for volatile organics, extractable organics, metals, and explosives. Sample and analyze Potable Well No. 3 (southwest of JEP) for volatile organics, extractable organics, metals, and explosives. Analyze the upgradient well for volatile organics, extractable organics, metals, and explosives.

standards for sodium exist, concentrations of sodium greater than 20 mg/l are not recommended for persons with sodium-restricted diets. A memo and posted warnings have been issued for NBAFS. The locations of Wells No. 1 and 2 are shown in Fig. 1. A photograph of Well No. 1 is presented in App. J.

The second environmental concern is focused on the presence of unexploded ordnance (UXO) which may be present on as much as 2,200 acres of NBAFS as a result of the use of Joe English Pond as a bombing target and the use of a strafing range (the shooting field) for vehicle targets for machinegun, aerial cannon, and rocket attacks. Clearing by Explosives Ordnance Detachment (EOD) units has been restricted to construction/development activities and to detonate potentially live UXO found as a consequence of operations or recreation. The target areas are littered by shrapnel, spent bullets, and bomb/rocket casings. Such objects can be found in lesser densities in most areas of NBAFS. Increased recreational use of NBAFS potentially increases contact with UXO by the users of the base facilities. The location of Joe English Pond and the shooting field are also shown in Fig. 1.

RECOMMENDATIONS

The recommended actions are intended to be used as a guide in the development and implementation of the Phase II study. The detailed recommendations developed for further assessment of Sites 1, 2, and 3 are presented in Sec. 6.0. These recommendations are summarized as follows:

Site No. 1: Chemical Spill/Disposal Site	Install 1 upgradient and 2 downgradient monitor wells and monitor quarterly for total organic halogens, petroleum hydrocarbons, total organic carbon, and metals, as described in Table 6.1-2. Monitor Potable Wells No. 1 and 2 quarterly for volatile organics and as needed for extractable organics and metals, as described in Table 6.1-2.

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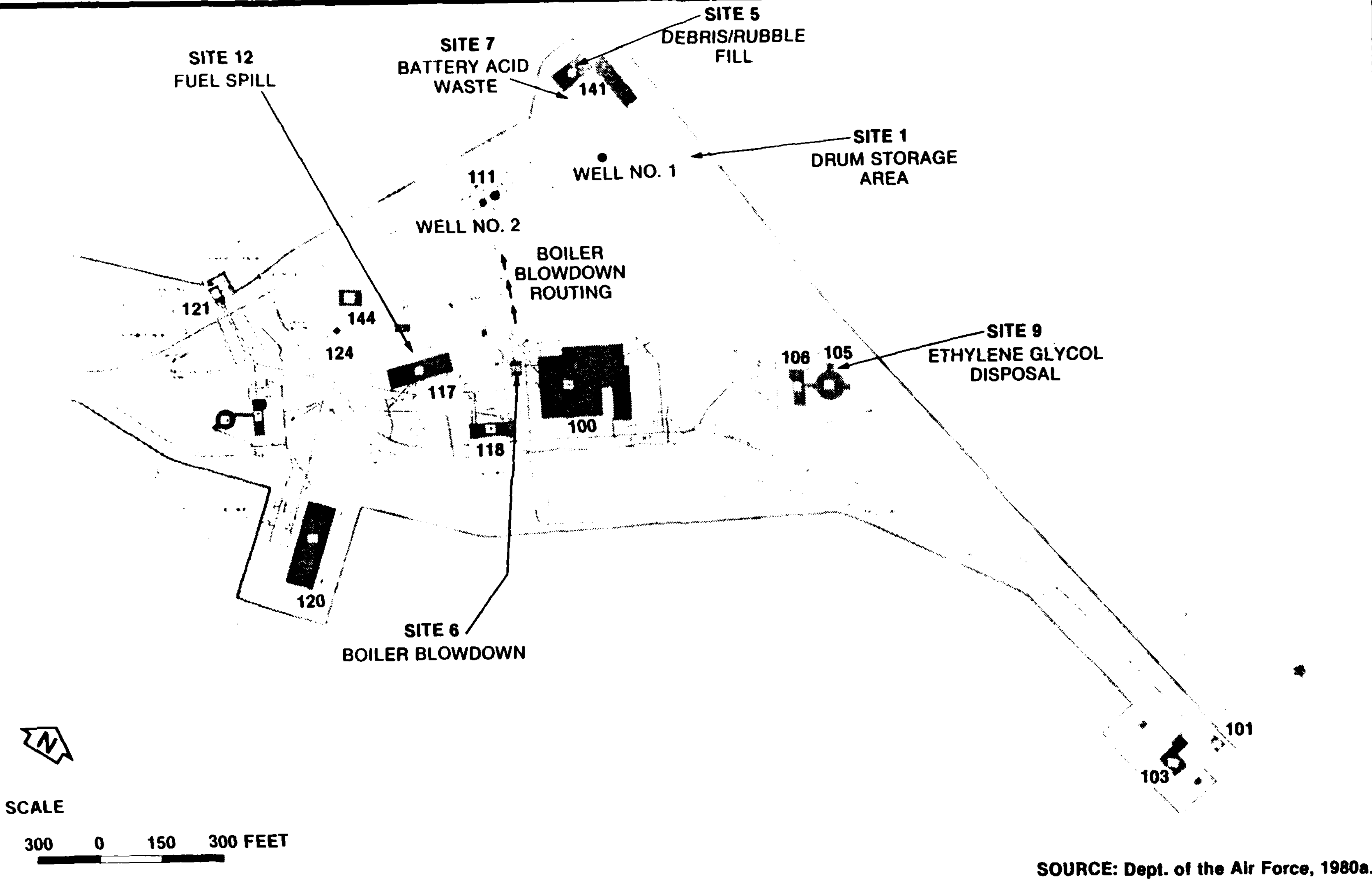


SOURCE: Dept. of the Air Force, 1980a.

Figure 2
DISPOSAL SITE LOCATIONS IN THE
DEVELOPED AREAS AT NBAFS

INSTALLATION
RESTORATION PROGRAM
NEW BOSTON AIR FORCE STATION

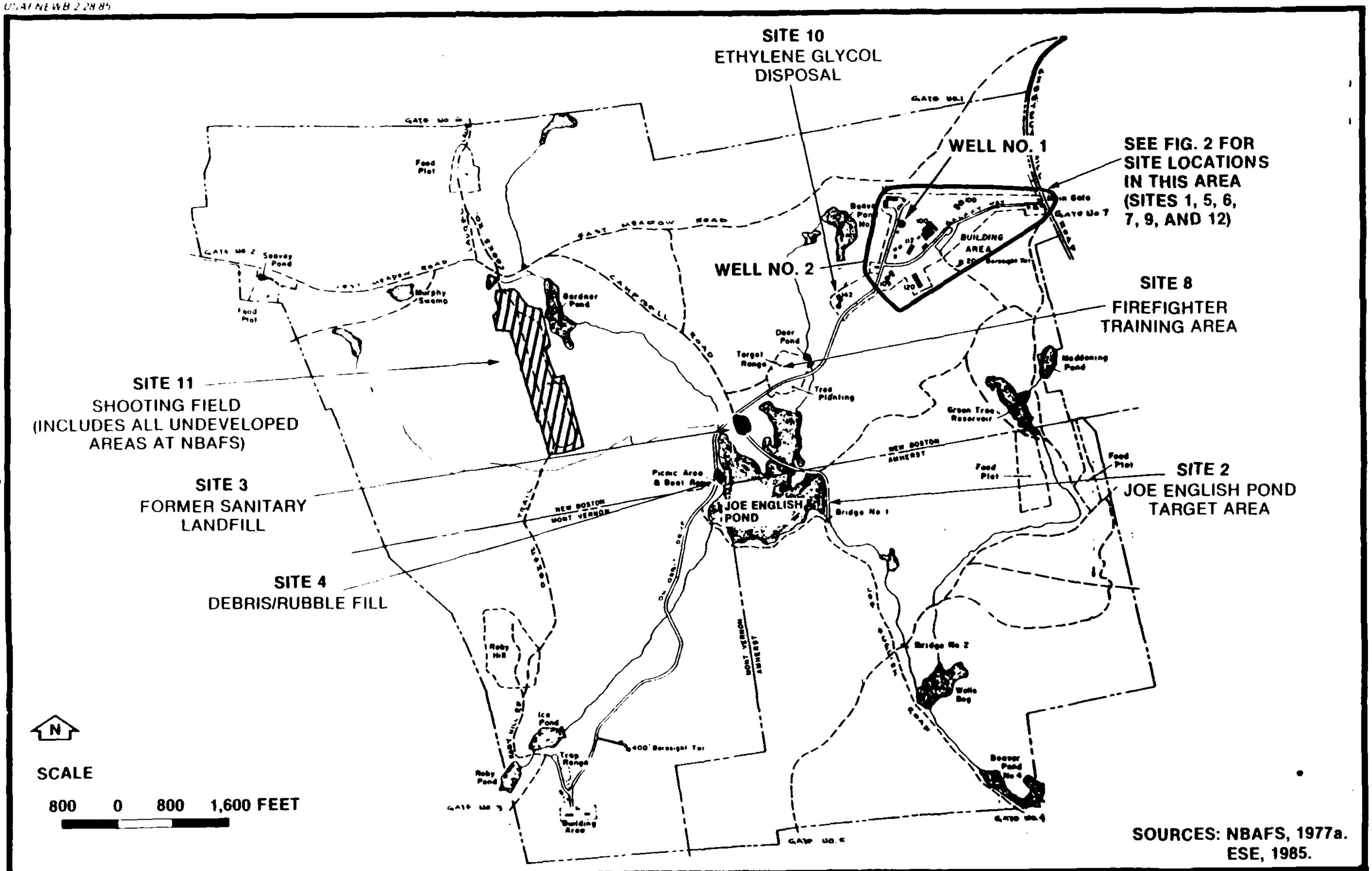


Figure 1
LOCATION OF DISPOSAL SITES ON NBAFS
(See Fig. 2)

INSTALLATION
RESTORATION PROGRAM
NEW BOSTON AIR FORCE STATION

Table 1. Summary of Potential Contamination Sites on NBAFS (Continued, Page 2 of 2)

Site No.	Site Description and Location Figure	Report Designation	Date of Operation or Occurrence	Conclusions
7	Stormwater Drainage System Disposal Site No. 2 (Battery Acid Waste) (Fig. 2)	SD-2	1974-present	No potential for significant residual contamination. Referred to base environmental program for assessing alternate disposal practices. No HARM rating. No Phase II studies recommended.
8	Firefighter Training Area (Fig. 1)	FTA-1	1974-present	No potential for residual contamination. All POL is contained in metal drums. No HARM rating. No Phase II studies recommended.
9	Chemical Disposal Site No. 2 (Fig. 2)	CS-2	1960-1974	No potential for residual contamination. Practice has ceased. No HARM rating. No Phase II studies recommended.
10	Chemical Disposal Site No. 3 (Fig. 1)	CS-3	1978-present	No potential for residual contamination. Practice has been referred to base environmental program for modification. No HARM rating. No Phase II studies recommended.
11	Shooting Field and Undeveloped Impact Areas (Fig. 1)	Not Applicable	1942-1958	No potential for significant residual contamination. No HARM rating. Referred to base environmental program for land use considerations.
12	Fuel Spill Site (Fig. 2)	FS-1	1976	No potential for residual contamination. One-time occurrence with complete containment of POL. No HARM rating. No Phase II studies recommended.

Source: ESE, 1985.

Table 1. Summary of Potential Contamination Sites on NBAFS

Site No.	Site Description and Location Figure	Report Designation	Date of Operation or Occurrence	Conclusions
1	Chemical Spill/Disposal Site No. 1 (drum storage area) (Fig. 2)	CS-1	1974-1985	Potential for residual contamination and contaminant migration. Received HARM score of 62. Phase II studies recommended.
2	Joe English Pond (Fig. 1)	JEP	1942-1958	Potential for residual contamination and contaminant migration. Received HARM score of 61. Phase II studies recommended.
3	Landfill No. 1 (Fig. 1)	LF-1	1960-1968	Potential for residual contamination and contaminant migration. Received HARM score of 51. Phase II studies recommended.
4	Landfill No. 2 (Fig. 1)	LF-2	1960-1965	No potential for residual contamination. Debris landfill closed. No HARM rating. No Phase II studies recommended.
5	Landfill No. 3 (Fig. 2)	LF-3	1960-1965	No potential for residual contamination. Construction debris and rubble landfill closed. No HARM rating. No Phase II studies recommended.
6	Stormwater Drainage System Disposal Site No. 1 (Boiler Blowdown) (Fig. 2)	SD-1	1960-present	No potential for residual contamination. NPDES-permitted discharge. NO HARM rating. No Phase II studies recommended.

App. G. The HARM system is designed to indicate the relative need for followup action (Phase II).

FINDINGS AND CONCLUSIONS

The goal of the IRP Phase I study is to identify sites where there is a potential for environmental contamination resulting from past waste disposal practices and to assess the potential for contaminant migration from these sites.

Twelve sites were identified at NBAFS as having potential for environmental contamination. These sites, dates of operation or occurrence, and elevations of these sites are summarized in Table 1. Site locations are shown in Figs. 1 and 2. The relative potential of the sites for environmental contamination and containment migration was assessed, and Phase IV monitoring recommendations were made for Sites 1, 2, and 3. Photographs of Sites 1, 2, and 3 are presented in App. J.

In addition to the sites identified above, two additional environmental concerns were identified.

First, the storage and use of road salt to control ice is common practice in New England and has resulted in migration of sodium and chloride into the base water supply via the stormwater drainage system. Both the sodium and chloride concentrations in the base potable water supply are elevated above background. Chloride concentrations show an increasing historical trend and since 1980 have generally averaged approximately 200 milligrams per liter (mg/l). In 1984, a single sample violated the National Secondary Drinking Water Regulation (NSDWR) maximum contaminant level of 250 mg/l chloride. Because of the rise in chloride content, sodium concentrations have been measured since 1980. Concentrations in the potable water serving Areas A and B, from Wells No. 1 and 2, ranged from 48 to 103 mg/l. Background (Well No. 3) ranged from 8.0 to 13.5 mg/l. Although sodium at the above levels poses no risk to the population in general and no New Hampshire or Federal on NBAFS. A fisheries management program includes stocking of brook trout and rainbow trout as well as management for various warm-water centrachid game fish.

Several threatened and endangered species are known to occur on NBAFS and in the area. The bald eagle is the only endangered species reported on NBAFS; however, the osprey, red-shouldered hawk, and whippoorwill are considered threatened. The Eastern box turtle, classified as rare, may occur in the area.

As a result of the geohydrological environment and soil characteristics, conditions on NBAFS are conducive to migration of contaminants if introduced into the environment. Potential contaminant migration could occur laterally and vertically through the fractured bedrock to the underlying aquifer system. Mobile contaminants in the vicinity of Joe English Pond may additionally migrate toward surface water channels and could potentially contaminate the surface water system, which flows offbase and ultimately is used as a potable water source.

METHODOLOGY

During the course of the Phase I investigation of NBAFS, interviews were conducted with base personnel (past and current) familiar with past waste disposal practices; file searches were performed for past hazardous waste activities; interviews were held with local, state, and Federal agencies; and ground reconnaissance inspections were conducted at past hazardous waste activity sites.

Three sites were identified as potentially containing hazardous contaminants resulting from past activities. These sites have been assessed using the Hazard Assessment Rating Methodology (HARM), in which factors such as site characteristics, waste characteristics, potential for contaminant migration, and waste management practices are considered. The details of the rating procedure are presented in potentiometric surface of the aquifer generally conforms to the topographic gradient with ground water flow from topographically high areas to topographically low areas. In the low-lying areas on NBAFS, near Joe English Pond, the aquifer system is under artesian conditions. Recharge to the aquifer occurs primarily through local surface infiltration of precipitation in the outcrop areas. Discharge from the aquifer occurs through upward leakance and well withdrawal.

A historical increase in chlorides has been observed in Wells No. 1 and 2, located in areas receiving significant quantities of runoff contaminated by road salt in winter. Because of the high permeability of the shallow, coarse soils and infiltration capacity of the fractured bedrock, such runoff may easily impact the aquifer in localized ones.

Average annual rainfall at NBAFS is approximately 43 inches, with average annual snowfall approximately 41 inches. The mean annual lake evaporation rate in the vicinity of NBAFS is 26 inches. Therefore, the net annual precipitation rate for NBAFS (rainfall minus evaporation) is 17 inches. Average monthly temperatures range from 22.6°F in January to 69.8°F in July. The 1-year, 24-hour rainfall event is approximately 2.5 inches. The value of 17 inches per year for net precipitation indicates a significant potential for infiltration as well as surface runoff and the occurence of permanent surface water features. The 1-year, 24-hour rainfall event of 2.5 inches indicates a significant potential for runoff and erosion. These data indicate that any contamination at NBAFS could migrate significantly by both surface water and ground water pathways.

NBAFS is located near the southern edge of the Northern Hardwoods-Spruce Forest ecoregion of the Laurentian Forest physiographic province. Approximately 4 percent of the station consists of developed or semi-developed land. The remainder is dominated by forest composed mainly of white pine and eastern hemlock. Red oak is the dominant hardwood species. Fourteen ponds and 7.1 miles of stream/wetland habitat occur

ENVIRONMENTAL SETTING

NBAFS is situated in the south-central portion of New Hampshire in the Merrimack River Basin in the Merrimack Syncline. The developed area of NBAFS is mainly situated on the northern facing slope of Chestnut Hill, one of three major topographic highs within the installation boundary. Elevations at NBAFS vary from approximately 350 feet mean sea level (ft MSL) along Joe English Brook to 1,288 ft MSL on top of Joe English Hill. Physiographically, the station is located in a bowl-shaped depression centered at Joe English Pond with upland ridges near the installation boundaries forming the lips of the bowl. The major drainage feature on NBAFS is the Joe English Pond system. Joe English Pond, situated in the center of the installation, is the collection point for drainage from a series of 14 upland ponds and wetland areas; the pond system discharges via Joe English Brook, which flows offbase to the southeast into the Amherst Conservation District. Streams on NBAFS include those flowing to Joe English Pond from the upland wetland areas of Murphy Swamp, Gardner Pond, Beaver Pond, Deer Pond, and Ice Pond.

Soils on NBAFS consist of very strong, fine sandy loams, with variable amounts of large stones and coarse sand. These soils usually occur as a thin veneer consisting of a loam matrix with many large boulders, cobbles, and pebbles over the highly fractured and jointed bedrock unit. These soils are considered highly permeable and would be susceptible to infiltration by contaminants.

Based on very limited data, surface water bodies at NBAFS generally can be characterized by low concentrations of dissolved solids [generally <30 micromhos per centimeter (umhos/cm) conductance at 25°C] and slightly acidic pH (pH 5 to 6). In the area possibly receiving runoff from the developed areas (Areas A and B), a single higher conductivity value (100 umhos/cm at 25°C in Deer Pond) was observed.

A single aquifer system is found beneath NBAFS; this system occurs within the fractured metamorphic and metasedimentary rock units. The for use as a tracking station. On Oct. 1, 1958, the 6594th Instrumentation Squadron was activated at the New Boston site. The site was designated the New Boston Tracking Station and Data Acquisition Annex (later redesignated NBAFS). The requirement for a satellite and missile tracking station at NBAFS evolved from the U.S. Air Force (USAF) satellite testing and development program.

Operations began at NBAFS on April 1, 1960, using van-mounted equipment. Locations of permanent operational areas, boresight towers, antennas, cables, and access roads were decontaminated and surveyed before construction was begun. Portable operations were gradually phased out, and the station was operating in permanent facilities by June 1964.

On Oct. 1, 1979, the 6594th Instrumentation Squadron was redesignated Detachment (Det.) 2 of HQ Air Force Satellite Control Facility (AFSCF).

The overall mission of AFSCF is to acquire, maintain, and operate a common-user spacecraft support network for DOD. The Satellite Control Facility commands and controls orbiting military spacecraft through its worldwide network of satellite tracking and commanding stations. The specific mission of Det. 2, operating as an element of AFSCF, is to develop and maintain the capability to perform acquisition, tracking, and commanding of specified spacecraft. Telemetry received from these space vehicles is processed and reported. USAF space and satellite programs are supported during research and development as well. An element of the AFSCF global national range, Det. 2 provides time-critical space vehicle operations for global commanding and control. In support of this mission, Det. 2 operates and maintains NBAFS.

The only tenant onbase is Det. 1, 2014th Communications Squadron (CS), Air Force Communications Command (AFCC). The mission of Det. 1, 2014th CS is to provide a 2-way, high data rate transfer capability from NBAFS to HQ Satellite Control Facility.

EXECUTIVE SUMMARY

INTRODUCTION

The Department of Defense (DOD) has developed a program to identify and evaluate past hazardous material disposal sites on DOD property, to control the migration of hazardous contaminants, and to control hazards to health or welfare that may result from these past disposal operations. This program is known as the Installation Restoration Program (IRP) and consists of four phases: Phase I--Initial Assessment/ Records Search, Phase II--Confirmation and Quantification, Phase III--Technology Base Development, and Phase IV--Operations/Remedial Actions. Environmental Science and Engineering (ESE), Inc. conducted the Phase I study of New Boston Air Force Station (NBAFS), New Hampshire, with funds provided by the Air Force Systems Command (AFSC). This volume contains the Initial Assessment/Records Search of NBAFS.

INSTALLATION DESCRIPTION

NBAFS is situated in southeast New Hampshire, in Hillsborough County, approximately 12 miles west of the city of Manchester, N.H. The station occupies 2,826 acres divided into five operational areas. Areas A and B comprise the majority of the developed areas of the base, which consists of the Satellite Communications (SATCOM) terminal; antenna systems; facilities, engineering, maintenance, security, and administrative systems. Areas C, D, and E are substantially forested and comprise the majority of the land area. These areas contain former bombing and strafing ranges, recreation facilities, a 400-foot (ft) remote boresight tower, wells, and a pumping system. Areas A and B and the limited facilities in Areas C through E comprise approximately 125 acres. The remainder of the station consists of forest, ponds, and wetlands.

The land occupied by NBAFS was a bombing range controlled by the 14th Air Force at Grenier AFB from 1942 to 1958, when the site was selected

LIST OF FIGURES
(Continued, Page 2 of 2)

1.2 PURPOSE, AUTHORITY, AND SCOPE OF THE ASSESSMENT

The IRP has been developed as a 4-phase program, as follows:

Phase I--Initial Assessment/Records Search

Phase II--Confirmation and Quantification

Phase III--Technology Base Development

Phase IV--Operations/Remedial Actions

Environmental Science and Engineering, Inc. (ESE) conducted an initial assessment/records search at New Boston Air Force Station (NBAFS), with funds provided by the Air Force Systems Command (AFSC). This report contains a summary and evaluation of the information collected during Phase I of the IRP and recommendations for any necessary Phase II action.

The objective of Phase I was to identify the potential for environmental contamination from past waste disposal practices at NBAFS and to assess the potential for contaminant migration. Activities performed in the Phase I study included the following:

1. Review of site records;
2. Interviews with personnel familiar with past generation and disposal activities;
3. Inventory of wastes;
4. Determination of estimated quantities and locations of current and past hazardous waste treatment, storage, and disposal;
5. Definition of the environmental setting at the base;
6. Review of past disposal practices and methods;
7. Performance of field inspections;
8. Gathering of pertinent information from Federal, state, and local agencies;
9. Assessment of potential for contaminant migration; and
10. Development of conclusions and recommendations for any necessary Phase II action.

NBAFS does not possess its own aircraft. As a result of the flight commitments of the New Hampshire National Guard, no daytime aerial tour could be scheduled during the week of the site visit.

ESE performed the onsite portion of the records search during February 1985. The following team of professionals was involved:

- o Michael A. Keirn, Ph.D., Senior Scientist and Team Leader, 20 years of professional experience.
- o Donald F. McNeill, Geologist, 3 years of professional experience.
- o Douglas A. Dean, Engineer, 3 years of professional experience.

Detailed information on these individuals is presented in App. B.

1.3 METHODOLOGY

The methodology utilized in the NBAFS records search began with a review of past and current industrial/laboratory operations conducted at the base. Information was obtained from available records such as shop files and real property files, as well as interviews with past and current base employees from the various operating areas. Interviewees included current and former personnel associated with the mission of NBAFS and tenant organizations onbase. A list of interviewees, by position and approximate years of service, is presented in App. C.

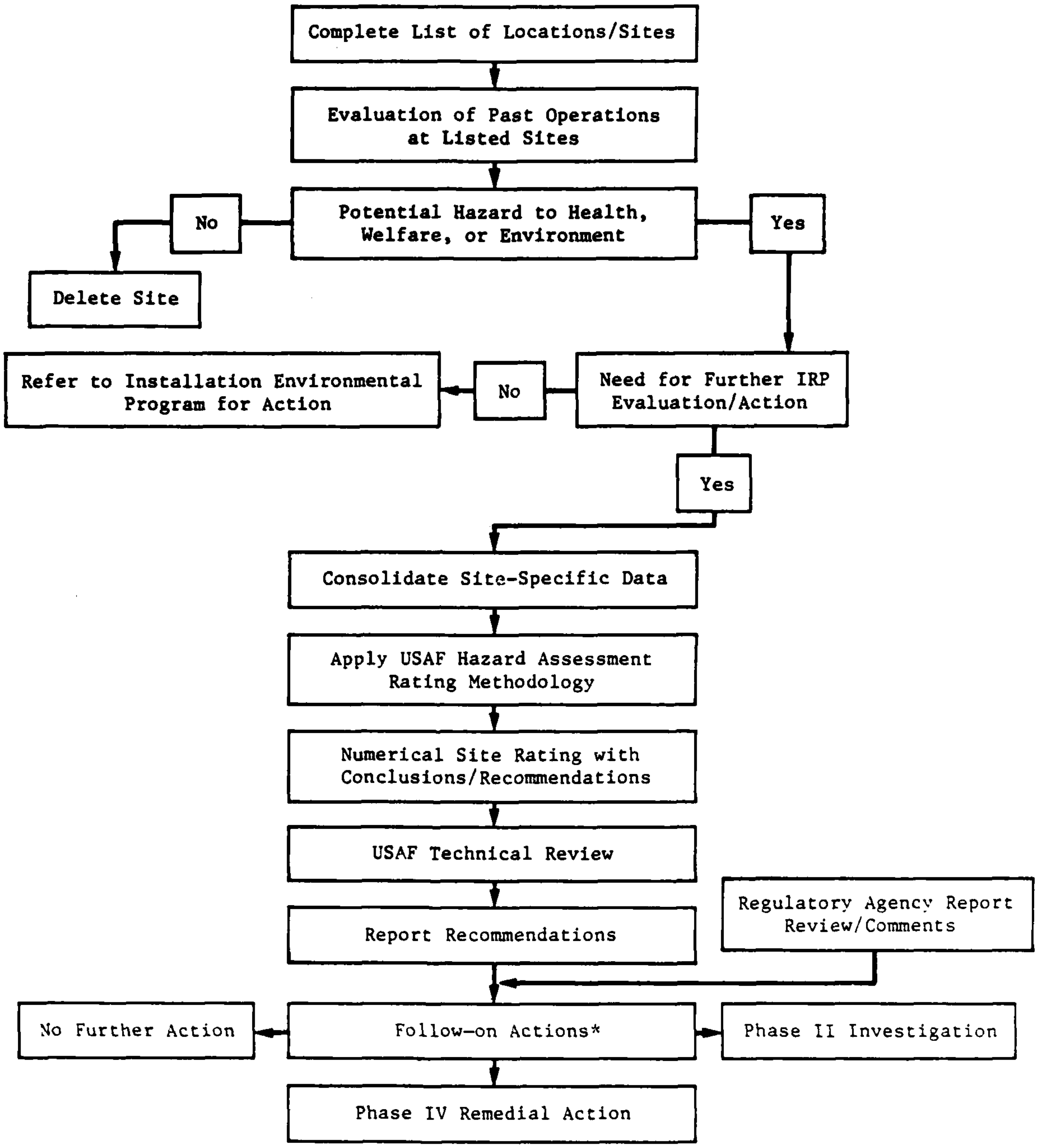
Concurrent with the base interviews, the applicable Federal, state, and local agencies were contacted for pertinent base-related environmental data. The outside records centers and agencies contacted and personnel interviewed are listed in App. C.

The next step in the activity review was to determine the past management practices regarding the use, storage, treatment, and disposal of hazardous materials from the various operations on the base. Included in this part of the activities review was the identification of all known past disposal sites and other possible sources of contamination such as spill areas.

A general ground tour of the identified sites was then made by the ESE Project Team to gather site-specific information including: (1) visual evidence of environmental stress, (2) the presence of drainage ditches and systems, and (3) visual inspection for any obvious signs of contamination or leachate migration. A helicopter overflight was not available as part of the onsite visit.

Using the process shown in Fig. 1.3-1, a decision was then made, based on all of the above information, regarding the potential for hazardous material contamination at any of the identified sites. If no potential existed, the site was deleted from further consideration. If potential for contamination was identified, the potential for migration of the contaminant was assessed based on site-specific conditions. If there were no further environmental concerns, the site was deleted. If the potential for contaminant migration was considered significant, the site was evaluated and prioritized using the Hazard Assessment Rating Methodology (HARM). A discussion of the HARM system is presented in App. G.

PHASE I INSTALLATION RESTORATION PROGRAM
RECORDS SEARCH FLOWCHART



*Beyond scope of Phase I.

SOURCES: HQ AFESC, 1983.
ESE, 1985.

Figure 1.3-1
DECISION PROCESS

INSTALLATION RESTORATION PROGRAM
NEW BOSTON AIR FORCE STATION

2.0 INSTALLATION DESCRIPTION

2.1 LOCATION, SIZE, AND BOUNDARIES

NBAFS is situated in southeast New Hampshire, in Hillsborough County, approximately 12 miles west of the city of Manchester (Fig. 2.1-1). The townships of New Boston, Mont Vernon, and Amherst intersect on NBAFS property.

NBAFS occupies 2,826 acres and easements of 49.43 acres. NBAFS property is comprised of five operational areas (Areas A through E), training areas, and campsite areas (Figs. 2.1-2 and 2.1-3). Area A contains the main entrance, guard house, fire department, and main power substation. Area B is the main operational area, containing the antenna systems, the Satellite Communications (SATCOM) Terminal, the Technical and Administration Building, base support shops, Civil Engineering, Supply, Motor Pool/Maintenance, the sewage treatment plant, and the multipurpose recreation building. Area C contains a skeet range, and Area D contains a 400-foot (ft) boresight tower and an access road. Area E contains temporary storage buildings, wells, reservoirs, and a pumping system. The developed portion of NBAFS, which includes Areas A and B and limited facilities located in Areas C through E, consists of approximately 125 acres (NBAFS, 1983a).

As of September 1983, the NBAFS base population was 270 (NBAFS, 1983a). Many additional military personnel use NBAFS facilities for training. From October 1981 through September 1984, a total of 11,807 military personnel used NBAFS training facilities (NBAFS, 1983a).

The following facilities are located on the station (NBAFS, 1983a) and are shown on Figs. 2.1-2 and 2.1-3:

1. Bldg. 100: Technical and Administration Building housing the operations, control area, telemetry area, computer/data processing area, communications area, telephone switchboard,

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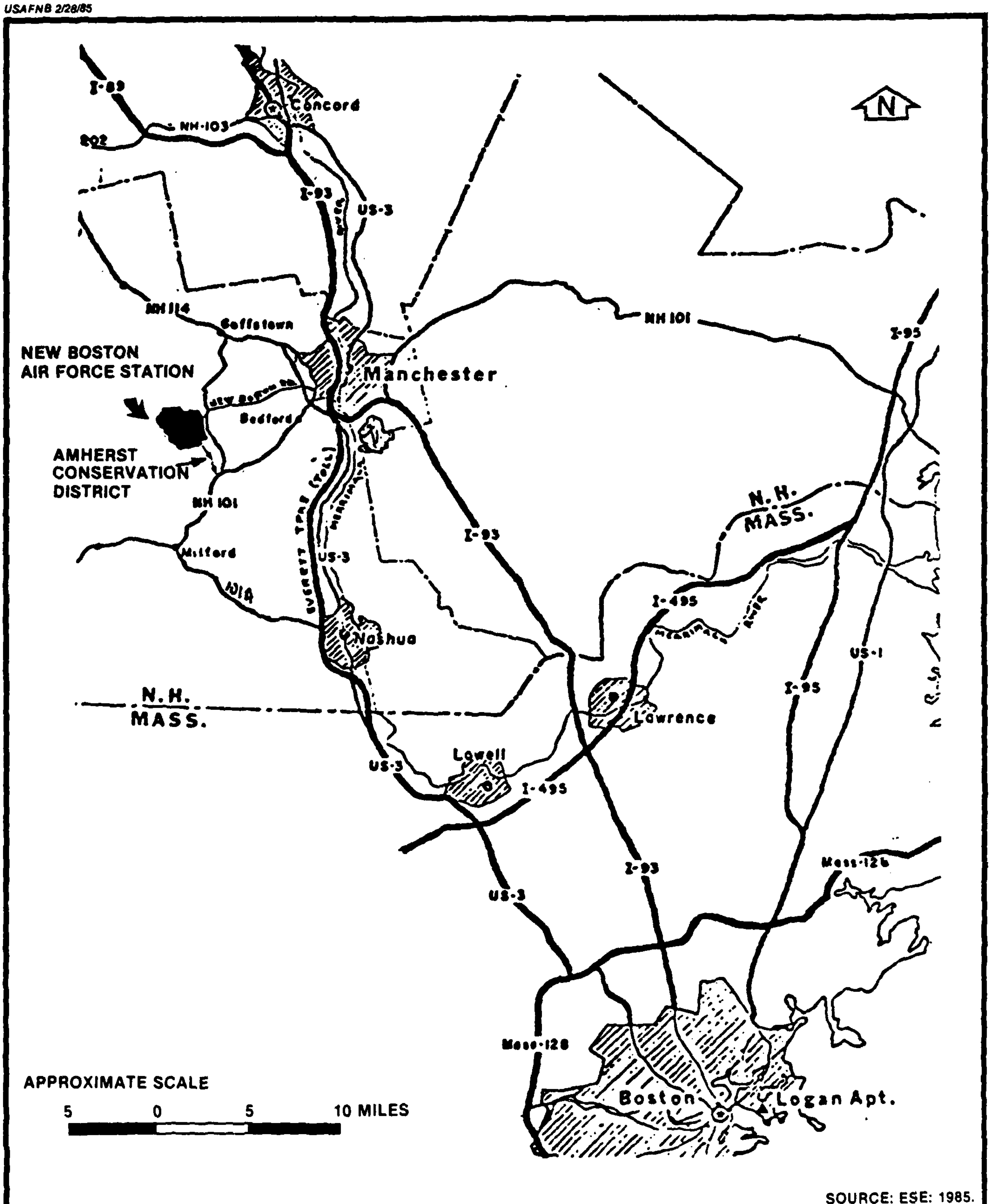

Figure 2.1-1
LOCATION OF NEW BOSTON
AIR FORCE STATION

INSTALLATION
RESTORATION PROGRAM
NEW BOSTON AIR FORCE STATION

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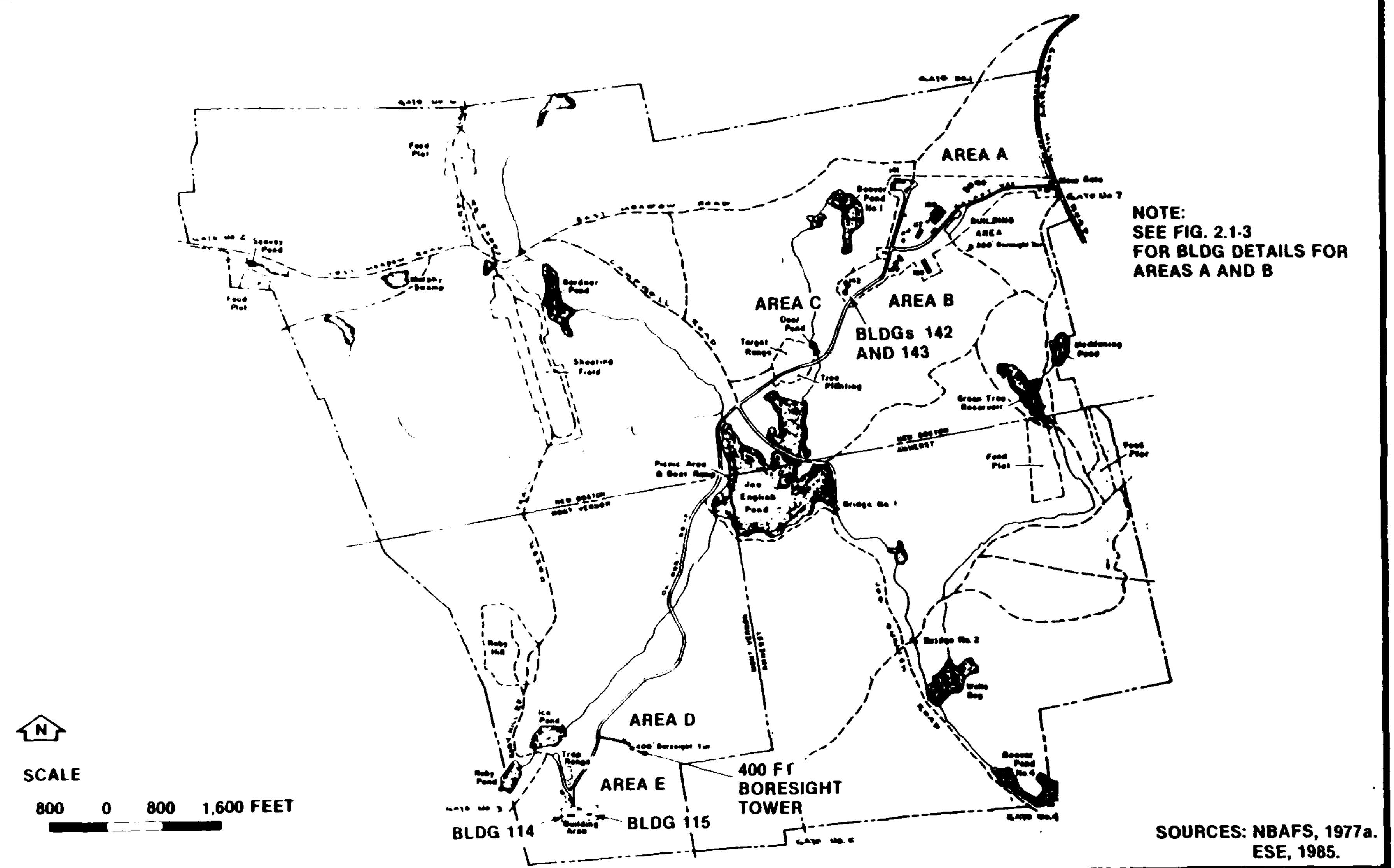

Figure 2.1-2
MAP OF NEW BOSTON AIR FORCE STATION

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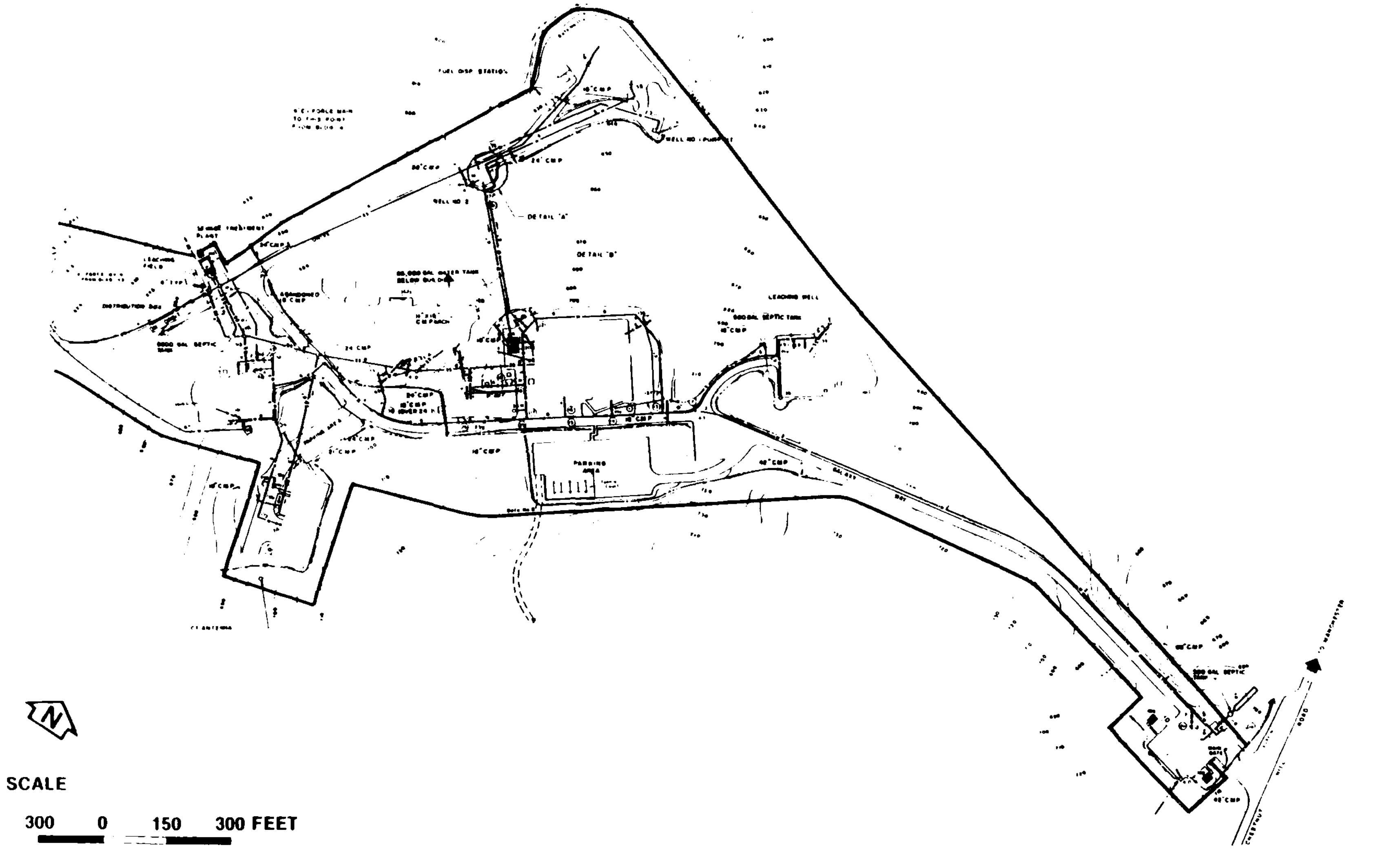

SOURCE: Dept. of the Air Force, 1980a.

Figure 2.1-3
MAP OF NBAFS AREAS A AND B

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Precision Measurement Equipment Laboratory (PMEL), and administration offices.

2. Bldg. 108/109: Space Ground Link System (SGLS) 46-ft antenna system.
3. Bldg. 105/106: SGLS 60-ft antenna system.
4. Bldg. 117: Civil Engineering shops.
5. Bldg. 120: Civil Engineering and Logistics.
6. Bldg. 141: Motor Pool.
7. Bldg. 142/143: SATCOM Terminal.
8. Bldg. 114/115: Temporary storage.
9. Bldg. 118: Multipurpose recreation building.
10. Bldg. 103: Fire department.
11. Bldg. 101: Security Police.
12. Bldg. 121: Sewage treatment plant.
13. A 400-ft farfield/nearfield antenna boresight facility is located off the service road approximately 2 miles from the main operational area. Instrumentation cabling between this tower and the SGLS area and between the SATCOM Terminal and the Technical and Administration Building is carried by an aboveground cable tray along the service road to the main operational area, where it continues through underground ducts to the individual buildings and antennas.

The land surrounding NBAFS is generally undeveloped and uncleared, consisting primarily of thickly wooded terrain. A software development facility is situated north of NBAFS. Land to the south of NBAFS has been reserved by the Township of Amherst as the Amherst Conservation District--a wildlife refuge, land, and water conservation area (see Fig. 2.1-1).

2.2 HISTORY

The history of NBAFS is summarized in this section. A number of USAF organization changes and designations have occurred which have affected the command structure of the installation. A brief chronology of these changes is presented in Table 2.2-1. The following paragraph provides a summary of the changes directly affecting NBAFS which is currently a subinstallatin of Sunnyvale Air Force Station, Calif.

The land occupied by NBAFS was a bombing range controlled by the Fourteenth Air Force at Grenier Air Force Base (AFB) from 1942 to 1958, when the site was selected for use as a tracking station. On October 1, 1959, the 6594th Instrumentation Squadron was activated at the New Boston site. The site was designated the New Boston Tracking Station and Data Acquisition Annex (later redesignated NBAFS). The requirement for a satellite and missile tracking station at NBAFS evolved from the USAF satellite testing and development program.

Operations began at NBAFS on April 1, 1960, using van-mounted equipment. Locations for permanent operational areas, boresight towers, antennas, cables, and access roads were decontaminated by the Fort Devens, Massachusetts, Explosive Ordnance Disposal (EOD) detachment and construction began. (The decontamination program was reviewed by Eglin AFB EOD). Portable operations were gradually phased out, and the station was operating in permanent facilities by June 1964.

The primary facilities consisted of the SATCOM terminal, a single 60-ft diameter antenna system, and support facilities. A second antenna system (46-ft) was installed in 1978.

On October 1, 1979, the 6594th Instrumentation Squadron was redesignated Det. 2 of the AFSCF.

AFSCF operational support increased from 300 contacts and 400 operational hours in 1960 to more than 94,000 contacts and more than 82,000 flight support hours in 1982 (AFSCF, 1982).

2.3 MISSION AND ORGANIZATION

The overall mission of the AFSCF is to acquire, maintain, and operate a common-user spacecraft support network for DOD. The Satellite Control

Table 2.2-1. Summary of Organization Structure and Historical Events Affecting NBAFS

Date or Period	Event
1942-1958	NBAFS areas used as bombing range by Grenier AFB
April 6, 1959	Air Research and Development Command (ARDC) (later redesignated AFSC) formed 6594th Test Wing at Lockheed Satellite Control Center, Palo Alto, Calif.
June 1959	USAF Ballistic Missile Division (AFBMD) Palo Alto personnel transferred to 6594th Test Wing
Oct. 1, 1959	New Boston Tracking Station and Data Acquisition Annex established as a subinstallation of Headquarters (HQ) ARDC as a component on the 6594th Test Wing
Nov. 15, 1959	6594th Test Wing reassigned from HQ-ARDC to HQ-AFBMD
Jan. 15, 1960	HQ 6594th Test Wing redesignated HQ 6594th Test Wing (Satellite)
March 1, 1960	HQ 6594th moved from Palo Alto to Sunnyvale AFS
April 1, 1960	Operations begin at NBAFS
April 1, 1961	Air Force System Command (AFSC) formed. Elements of ARDC and Air Material Command (AMC) reorganized as Space Systems Division (SSD) and Ballistic Systems Division (BSD). BSD and SSD placed under AFSC. SSD was predecessor of Space and Missile Systems Division (SAMSO) later designated Space Division (SD). The 6594th Test Wing (Satellite) was assigned to SSD.
Nov. 1, 1961	6594th Test Wing (Satellite) redesignated HQ-6594th Aerospace Test Wing
June 1964	NBAFS temporary facilities phased out
1978	46-ft-diameter second antenna system installed at NBAFS
Oct. 1, 1979	6594th redesignated Det. 2 of HQ Air Force Satellite Control Facility (AFSCF) of Sunnyvale Air Force Station

Note: Events directly affecting NBAFS are underlined.

Source: AFSCF, 1982.

Facility commands and controls orbiting military spacecraft through its worldwide network of satellite tracking and commanding stations. The specific mission of Det. 2, operating as an element of AFSCF, is to develop and maintain the capability to perform acquisition, tracking, and commanding of specified spacecraft. Telemetry received from these space vehicles is processed and reported. USAF space and satellite p grams are supported during research and development as well. An element of the AFSCF global national range, Det. 2 provides time-critical space vehicle operations for global commanding and control. In support of this mission, Det. 2 operates and maintains NBAFS.

The only tenant onbase is Det. 1, 2014th CS, Air Force Communications Command (AFCC). The mission of Det. 1, 2014th Communications Squadron (CS) is to provide a 2-way, high data rate transfer capability from NBAFS to HQ AFSCF (NBAFS, 1983a).

Contractors performing direct mission support on NBAFS are Ford Aerospace and Communications Corp. (FACC), Sperry Corp., Systems Development Corp., and RWTA Security.

Organizations, missions, and tenant activities are described in App. D.

3.0 ENVIRONMENTAL SETTING

This section describes the environmental conditions at NBAFS, including specific site data for meteorology, geology, soils, surface hydrology, geohydrology, water quality, and biota. These data subsequently are used in the HARM scoring system to numerically assess the pollutant transport mechanisms and potential receptors at the site. App. G describes the factors used in the HARM system.

3.1 METEOROLOGY

Climatological data relevant to NBAFS are summarized in Table 3.1-1. These data were collected at the National Weather Service (NWS) meteorological station at Nashua, N.H., which is located approximately 15 miles south of NBAFS. The period of record for the data is 29 years (1951-1980). The climate at NBAFS is categorized as a humid continental climate. Northwesterly winds are prevalent, bringing cold, dry air during the winter months and cool, dry air in the summer. However, the greater strength of the southerly winds during the summer months results in a flow of air from the southwest or west-southwest in July and August (NOAA, 1977). The overall wind movement is from the west-northwest during the transitional months of June and September and is northwesterly the rest of the year. Wind speeds range from an average of 9 miles per hour (mph) from June through November and up to 11 mph from March through May. Wind speed during the winter months averages 13 mph and may gust much higher with winter storms (NBAFS, 1981).

Precipitation is distributed throughout the year with no particular wet or dry season. The average monthly precipitation is 3.60 inches for the year, with variation of 3.09 to 4.47 inches per month. Precipitation occurrences average approximately 1 day of 3 for the year. The annual average rainfall is approximately 43 inches, and the annual average

Table 3.1-1. Climatological Data for NBAFS

Month	Average Temperature (°F)	Average Precipitation (inches)
January	22.6	3.56
February	24.5	3.09
March	33.6	3.89
April	44.9	3.55
May	55.5	3.49
June	64.8	3.14
July	69.8	3.18
August	67.7	3.48
September	59.5	3.65
October	49.1	3.67
November	38.7	4.47
December	26.6	4.10
Annual	46.4	43.27
Period of Record	1951-1980	1951-1980

Note: Data are for Nashua, N.H., Hillsborough County, Station Index 5712; 130 ft above mean sea level (MSL); 42°47'N, 71°29'W.

Sources: National Climatic Data Center, 1983.
ESE, 1985.

Table 3.4-1. New Hampshire Class B Water Quality Standards

Constituent	Standard
Dissolved Oxygen	≥75-percent saturation or 6 milligrams per liter (mg/l), unless naturally occurring
Coliform Bacteria	≤240/100 milliliters (ml)
pH	6.5-8.0, or as naturally occurs
Toxic Substances	In accordance with EPA (1980)
Sludge Deposits	No unreasonable kinds or quantities, unless naturally occurring
Oil and Grease	No unreasoanble kinds or quantities
Color	Not in unreasonable quantities, unless naturally occurring
Turbidity	≤10 units in cold-water fisheries ≤25 units in warm-water fisheries
Temperature	Meets New Hampshire Fish and Game Dept., New England Interstate Water Pollution Control Commission, and EPA (1976) requirements
Phosphorus	Shall not impose water uses, unless naturally occurring (generally ≤0.015 mg/l)
Gross Beta Radioactivity	≤1,000 picocuries/liter (pCi/l)
Strontium 90	≤10 pCi/l
Radium 226	≤3 pCi/l
Phenol	≤0.001 mg/l
Other Constituents	In accordance with EPA (1976)

Sources: New Hampshire Water Supply and Pollution Control Commission, 1984.
ESE, 1985.

Quality Criteria (EPA, 1976), and to meet criteria set forth by EPA in November 1980 (EPA, 1980) for 64 priority toxic substances. Numerical standards are presented in Table 3.4-1.

No comprehensive surface water quality studies have been performed for the surface waters of NBAFS. Secondary treated sanitary sewage effluent is discharged behind Bldg. 121 and flows into Beaver Pond (Fig. 3.2-1). Flow from Beaver Pond moves into Deer Pond via a stream with considerable marsh area. In general, the permitted discharge (see Sec. 4.1) meets discharge requirements. Blowdown from the heating and emergency power boilers located in Bldg. 100 (see Sec. 4.1) also is discharged into Beaver Pond via permitted discharge through the storm drainage system.

Available surface water quality data for NBAFS are presented in Fig. 3.4-1. These data from 1975 to 1979 were presented during a 1980 assessment of fish resources and the NBAFS Fisheries Management Plan (FWS, 1980). These data indicate that the surface waters at NBAFS are very low in total dissolved solids. Such soft acidic water is typical of New England drainages of granitic rock overlain with coarse glacial outwash such as occurs at NBAFS. The relatively high conductivity in Deer Pond [100 micromhos per centimeter (umhos/cm) at 25°C] at acidic pH (pH 5.0) suggests a possible effect due to runoff by stormwater containing road salt made up primarily of monovalent ions. These ions would increase the dissolved solids and conductivity without increasing alkalinity and pH. Beaver Pond and Deer Pond receive the runoff from Areas A and B, which contain most of the station's developed area. It is impossible, however, to make firm conclusions based on a single set of measurements as shown in Fig. 3.4-1.

A search of the EPA Storage and Retrieval (STORET) data base (EPA, 1985) did not indicate any additional water quality data for the Joe English Brook system. The nearest station is located in Bowman Brook near Bedford, N.H., at coordinates 42°48'09"N, 71°30'36"W. Bowman Brook

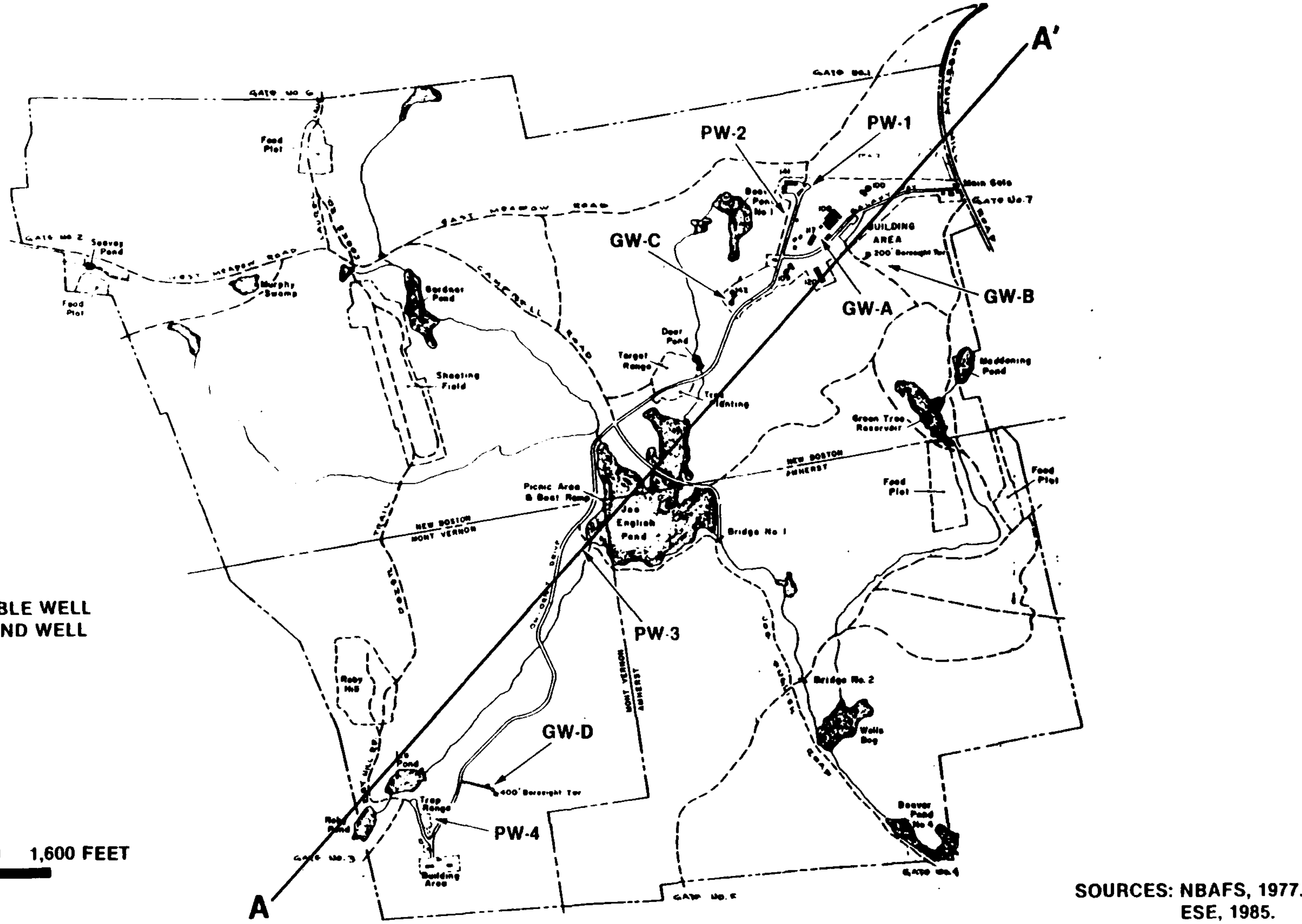
Table 3.3-1. Summary of Well Data

Well No.*	Location†	Approximate Site Elevation (MSL)	Well Depth (ft)	Casing Depth (ft)	Casing Size (inches)	Static Water Level at Installation (ft bls)	Date Installed
PW-1	Bldg. 141	637	250	32	8.0	45	1959
PW-2	Bldg. 111	642	250	13	8.0	42	1959
PW-3	Bldg. 148	540	225	15	6.0	Flowing artesian	1981
PW-4	Bldg. 112	820	285	21	6.0	41	1959
GW-A	Near Bldg. 100	700	275	20	8.0	18	1970
GW-B	500 ft from Bldg. 100	750	350	20	8.0	25	1975
GW-C	Bldg. 143	610	330	NA**	NA	73	1976
GW-D	Near Bldg. 113	800	365	20	8.0	44	1974

Note: bls = below land surface.

*PW = Potable well.
GW = Grounding well.
†See Fig. 3.3-4 for well locations.
**NA = Not available.

Sources: NBAFS, Well Water Data.
ESE, 1985.



KEY
PW POTABLE WELL
GW GROUND WELL

SCALE
800 0 800 1,600 FEET

SOURCES: NBAFS, 1977.
ESE, 1985.

Figure 3.3-4
INSTALLATION WELL LOCATIONS

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pumping in the upland areas and through artesian discharge at Well No. 3 near Joe English Pond.

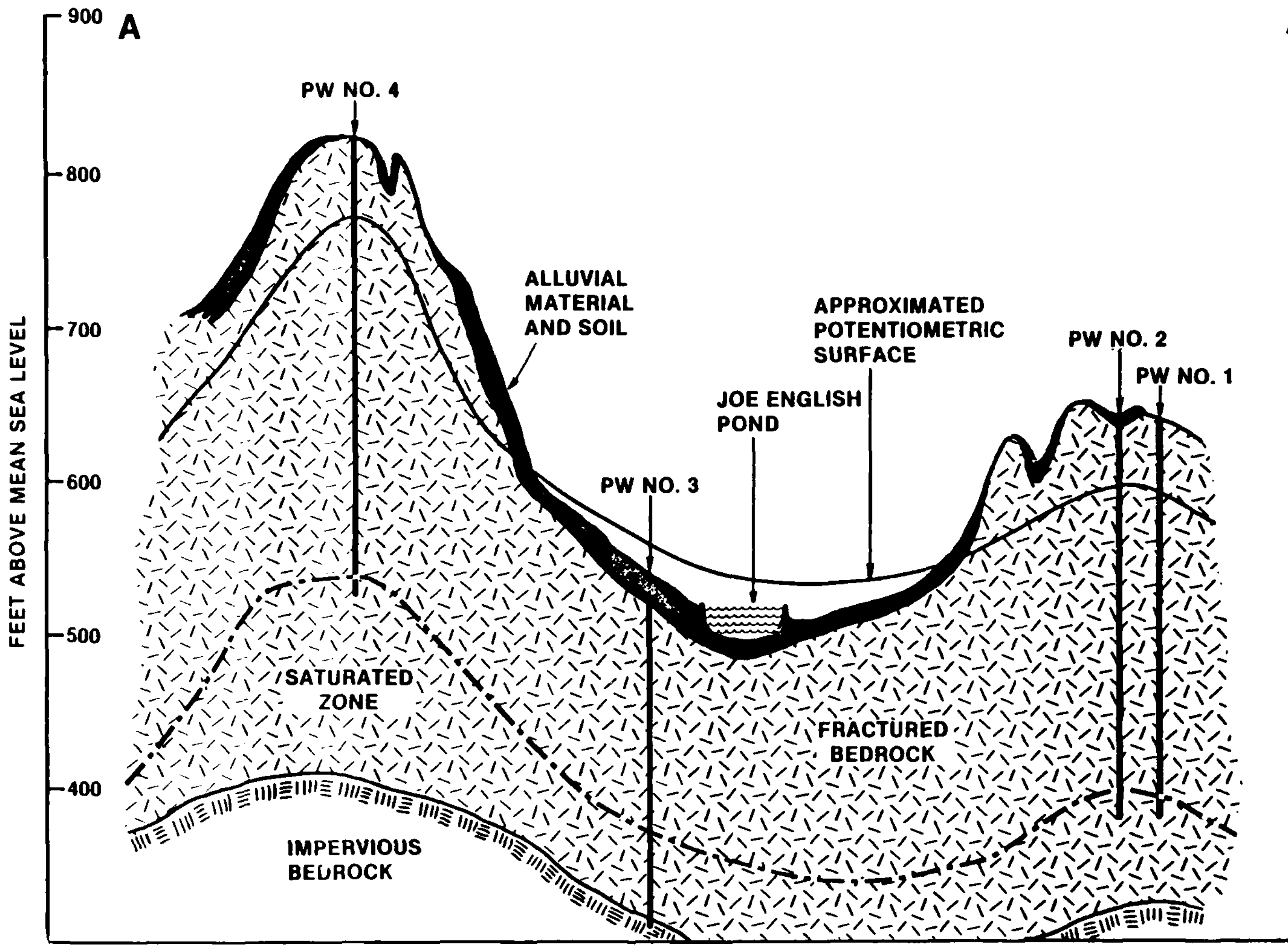
Eight wells are located on NBAFS (Fig. 3.3-4). Four wells were drilled for potable water supply, and three of these wells (Nos. 1, 2, and 3) are currently used for potable water. The fourth potable well (No. 4) is inactive due to abandonment of the facilities in the southwestern section of the installation (Area E). The remaining four wells on the installation are used as grounding wells for the antenna facilities (Bldg. 100, the 200-ft boresite, the SATCOM facility, and the 400-ft boresite). The grounding wells are enclosed and do not function as sources of potable or supply water. Well data for NBAFS are summarized in Table 3.3-1.

3.4 WATER QUALITY

3.4.1 SURFACE WATER QUALITY

As described in Secs. 3.2.1 and 3.2.2 and shown in Fig. 3.2-1, NBAFS is situated within a ring of ridges and high ground such that drainage is toward Joe English Pond. The outflow of Joe English Pond is southwesterly via Joe English Brook into the Amherst Conservation District, where the brook forms a component of the potable water supply for the city of Amherst, N.H. Fourteen ponds and 7 miles of streams form the surface drainage of the station and comprise the Joe English Pond drainage system (FWS, 1980).

Because of the use of Joe English Brook as a surface water supply source, the New Hampshire Water Supply and Pollution Control Commission has classified the system as Class B, suitable for swimming and other recreation, fish habitat, and after adequate treatment, for use as water supply (New Hampshire Water Supply and Pollution Control Commission, 1984). Class B waters are regulated specifically in terms of dissolved oxygen, coliform bacteria, pH, phenol, turbidity, and radioactivity. Other constituents (e.g., phosphorus) are regulated so as to not impair the assigned usages, to meet criteria set forth in EPA 1976 Water



HORIZONTAL SCALE: 1 INCH = 2,000 FT
PW = POTABLE WELL
NOTE: SEE FIGURE 3.3-4 FOR CROSS SECTION LOCATION

SOURCES: NBAFS, 1985.
ESE, 1985.

Figure 3.3-3
GENERALIZED HYDROGEOLOGIC
CROSS SECTION

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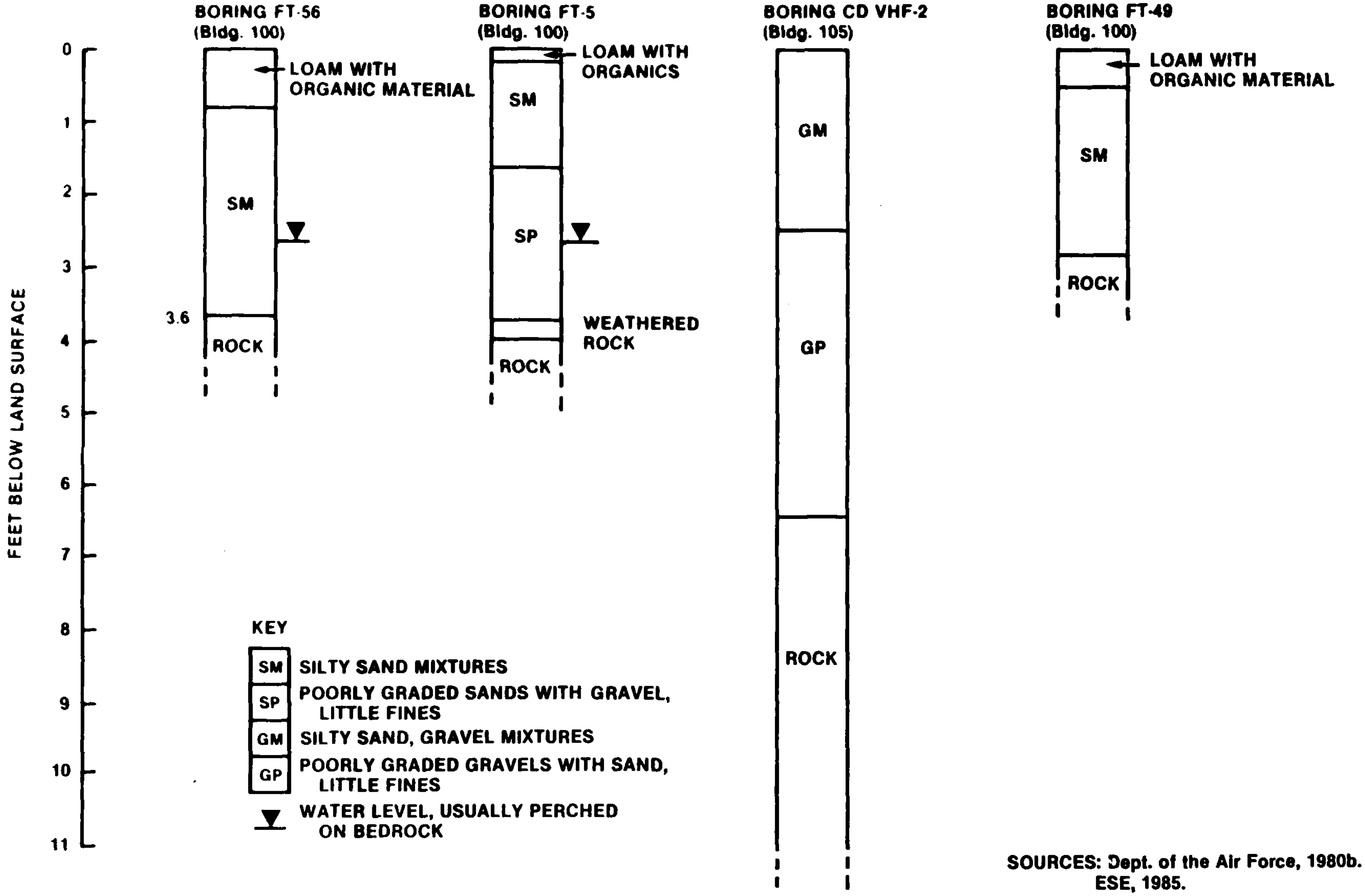

SOURCES: Dept. of the Air Force, 1980b.
ESE, 1985.

Figure 3.3-2
TYPICAL SOIL BORING ENCOUNTERED ON THE MAIN CANTONMENT AREA

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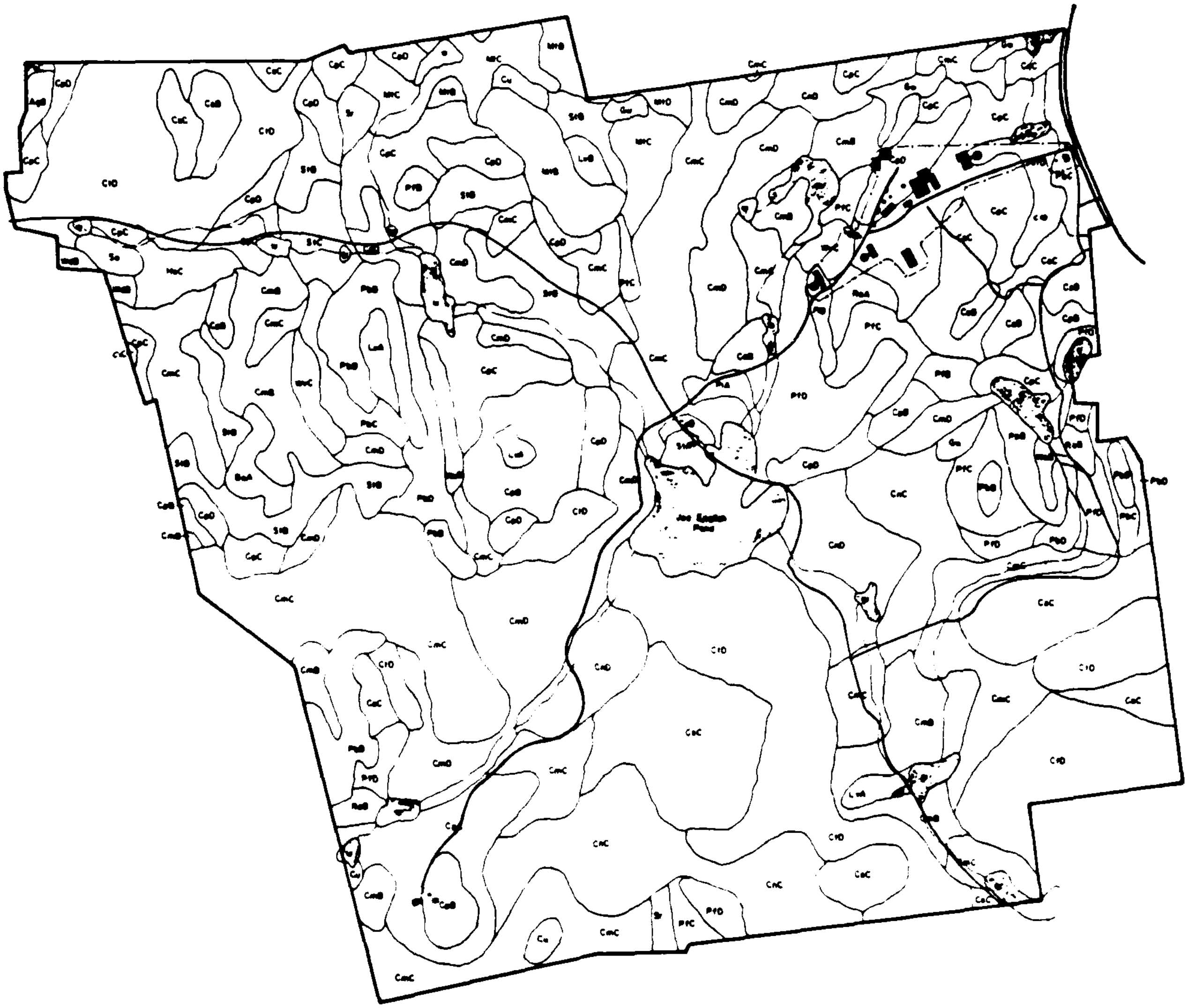

MAP SYMBOL	SOIL NAME
Bo	Borohemists, nearly level
Ca	Canton fine sandy loam
Cm	Canton stony fine sandy loam
Cn	Canton very stony fine sandy loam
[illegible]	Chatfield-Hollis-Canton complex
[illegible]	Chatfield-Hollis complex
Ct	Chatfield-Hollis-Rock outcrop complex
Cu	Chocorua mucky peat
Gw	Greenwood mucky peat
Hs	Hinckley loamy sand
Lv	Leicester-Walpole complex stony
Mt	Montauk stony fine sandy loam
[illegible]	Paxton fine sandy loam
[illegible]	Paxton [illegible] fine sandy loam

MAP SYMBOL	SOIL NAME
Pi	Pipestone loamy sand
Re	Ridgebury stony loam
So	Scarboro mucky loamy sand
Sr	Scarboro stony mucky loam [illegible]
St	Scituate stony fine sandy loam
Wo	Woodbridge loam
Wv	Woodbridge stony loam

NOTE: Third letter in Map Symbol denotes percentage of slope.

A - 0 to 3 percent slopes
B - 3 to 8 percent slopes
C - [illegible] to 15 percent slopes
D - 15 to 25 percent slopes
E - 25 to 35 percent slopes

SCALE
1000 0 1000 2000 FEET

SOURCES: NBAFS. 1984a.
ESE. 1985.

Figure 3.3-1
SURFICIAL SOIL TYPES

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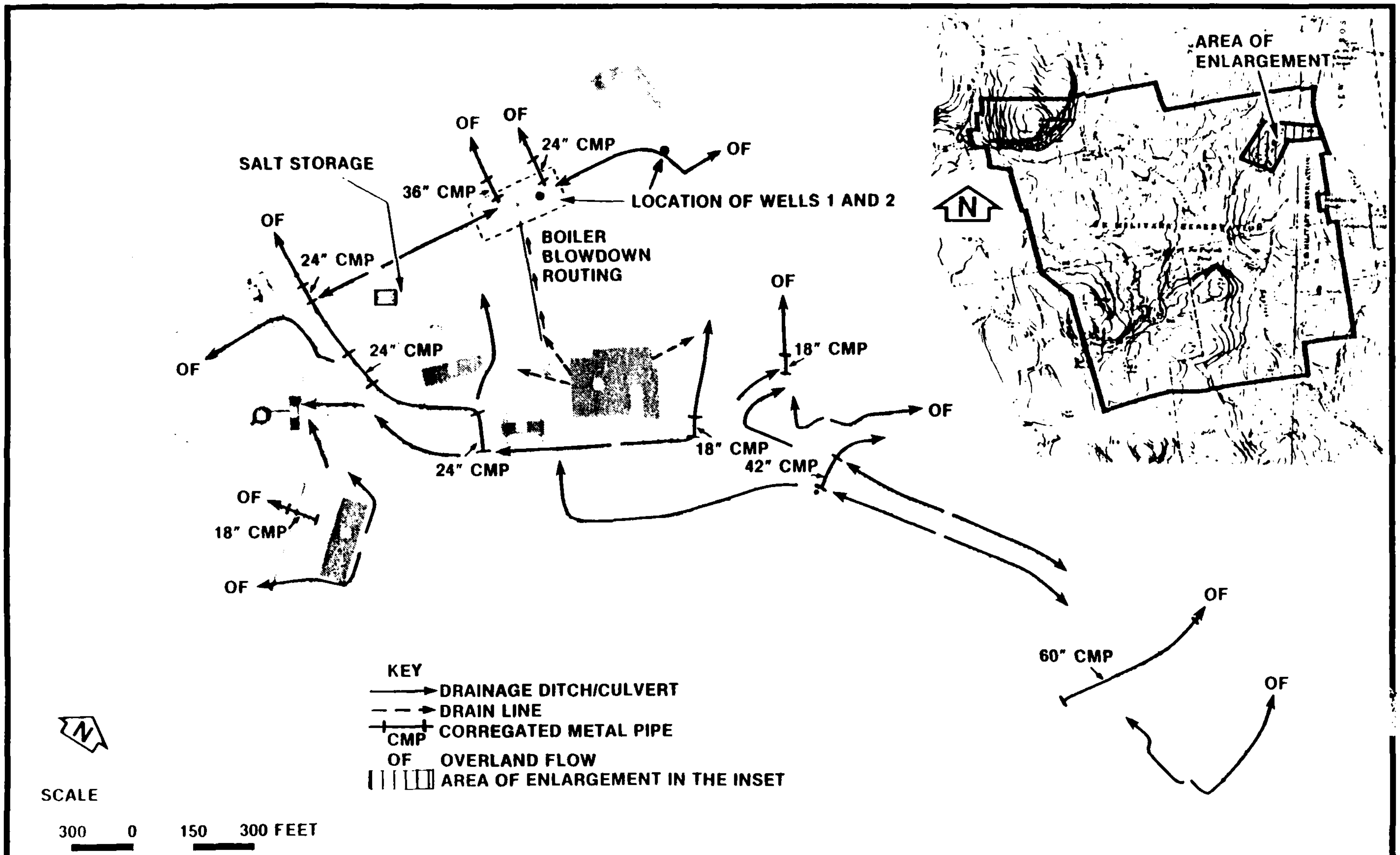
several feet of fibrous mucks and peats have accumulated on top of the alluvial deposits. In many cases, these bog areas represent former small lakes in which decomposing organic material has accumulated.

3.3.2 SOILS

The U.S. Soil Conservation Service (SCS) (1984) has mapped the soil types encountered on NBAFS (Fig. 3.3-1). On the main developed area, four soil types are found (NBAFS, 1984a): the Chatfield-Hollis-Canton complex, the Chatfield-Hollis-Rock outcrop complex, Paxton stony fine sandy loam, and Ridgebury stony loam. The soil profile overlying bedrock on NBAFS consists of a loam matrix with many large boulders, cobbles, and pebbles. The soils on the installation have slopes ranging from 0 to 25 percent (NBAFS, 1984a). Soil borings taken in the vicinity of Bldg. 100 indicate approximately 3 to 6 ft of unconsolidated sediments over bedrock (see Fig. 3.3-2). The maximum thickness of the soil matrix is approximately 8 ft (Dept. of the Air Force, 1980b). In localized areas, the soil profile is saturated in the lower sections due to impervious bedrock. However, due to the fractured nature of the bedrock, infiltration is predominant in most areas.

3.3.3 HYDROGEOLOGY

The aquifer system underlying NBAFS consists of fractured bedrock and slightly metamorphosed sedimentary rocks which have retained some effective porosity and permeability. This original effective porosity and the fractured nature of the bedrock provide a high degree of ground water transmissivity in the aquifer system. Water levels in the cased wells at NBAFS range from 73 ft below land surface (NBAFS, 1985) to a flowing artesian system near Joe English Pond. The potentiometric surface generally conforms to the topographic gradient and is artesian in the lower elevation areas (Fig. 3.3-3). No detailed potentiometric map exists for the installation. Recharge to the aquifer occurs through direct infiltration of precipitation through fractures and joints in the upland and outcrop areas. Discharge of the aquifer occurs through well



SOURCE: Dept. of the Air Force, 1980a.

Figure 3.2-2
STORMWATER DRAINAGE ON THE MAIN CANTONMENT AREA OF NBAFS

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Joe English Brook flows into the wetlands of the Amherst Conservation District, which abuts the southern border of NBAFS. NBAFS coordinates with the township of Amherst in maintaining the integrity and flow of Joe English Brook for downstream water management needs (NBAFS, 1983a) (see Fig. 2.2-1).

Stormwater drainage in Station Areas A and B (the main developed area) is controlled by a series of stormwater drains which collect and divert runoff toward topographically lower areas and wetlands immediately north and west of the station buildings. Stormwater drainage in Areas A and B is presented in Fig. 3.2-2.

3.3 GEOLOGY

3.3.1 GEOLOGIC SETTING

NBAFS is located on highly folded metasedimentary rocks which are structurally related to the Merrimack Syncline. This syncline complex trends northeast and exhibits highly folded sections due to east-west oriented compressive forces. The installation is situated on the Lower Devonian Littleton Formation (FWS, 1980), which consists of slightly to moderately metamorphosed rock. A gray, micaceous quartzite is the predominant rock type with lesser amounts of gray, coarse mica schist. The Littleton Formation extends more than 5,000 ft below MSL in the vicinity of NBAFS (FWS, 1980). The formation is bounded by Upper Devonian granite, granodiorite, and monzonite to the southeast and by Lower Devonian gray gneiss to the northeast. Bedrock underlying NBAFS is highly fractured in the upper sections due to structural compression and folding.

Most areas on the installation are covered by a thin veneer of Pleistocene and Recent glacial alluvium consisting of boulders, gravel, sand, and silt. Alluvium is generally thickest in the low-lying areas and valley bottoms. Soil borings taken for building construction (Dept. of the Air Force, 1980b) indicate a maximum thickness of about 8 ft of alluvium in Areas A and B. In some poorly drained areas, USAF NB 2 28 95

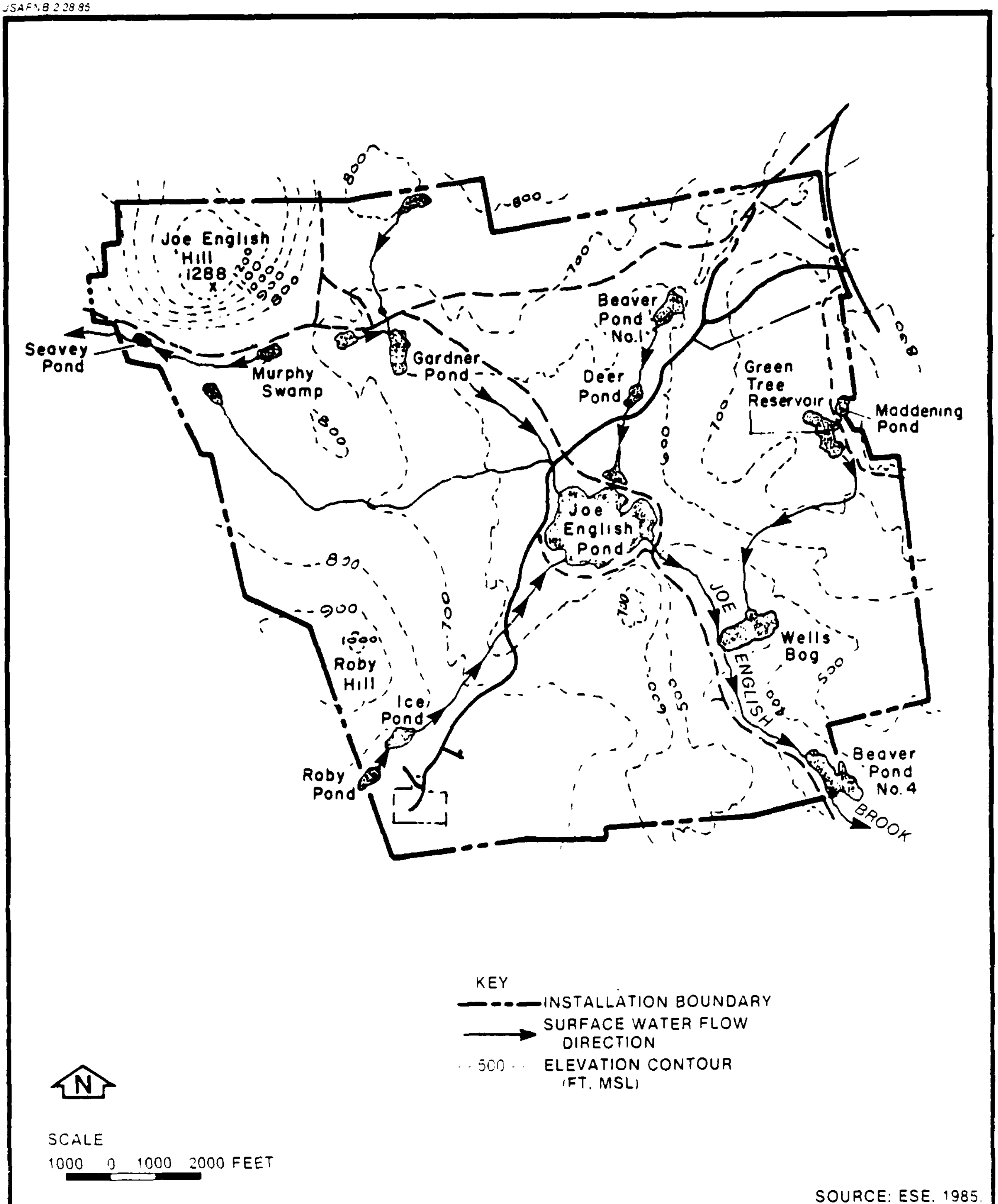

Figure 3.2-1
MAJOR TOPOGRAPHIC AND SURFACE WATER DRAINAGE FEATURES

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situated on the northwest-facing slope of Chestnut Hill, with an elevation of approximately 700 ft. The installation consists of three main physiographic structures: Chestnut Hill on the northeastern section of the base, Roby Hill in the southern/southwestern section, and Joe English Hill in the northwestern part of the installation. Within the center of the topographically high areas, the central lowland areas consist of Joe English Pond and its drainage area to the southeast. The generalized physiography of NBAFS is the shape of a bowl with Joe English Pond in the center. The three hills comprising NBAFS are part of a structural syncline complex which formed from east-west oriented compression. Elevations on NBAFS range from 350 ft MSL along Joe English Brook in the southeastern part of the base to approximately 1,280 ft MSL on top of Joe English Hill. Regionally, especially to the north and west, many peaks in the vicinity of NBAFS exceed 1,200 ft in elevation.

3.2.2 SURFACE HYDROLOGY

NBAFS lies within an extremely hilly and mountainous physiographic region which strongly influences the surface hydrology of the region. The major developed area of NBAFS is situated on Chestnut Hill, which is drained by a series of intermittent creeks and lowlands. Drainage from the main area of station development is generally in a northwesterly direction toward Beaver Pond No. 1 (Fig. 3.2-1). From Beaver Pond No. 1, drainage continues toward the centrally located Joe English Pond. This pond receives most of the drainage from the upland areas in the northeast, northwest, and southwest. From Joe English Pond, water flows southeast along Joe English Brook, where it exits the installation boundary. Many of the upland areas contain wetland swamps and small ponds which receive immediate drainage during precipitation and periods of melting snow. The major surface water drainage features are presented in Fig. 3.2-1. A total of 14 ponds (totaling 98 acres in surface area) and 7 miles of streams are present on NBAFS (FWS, 1980).

snowfall is about 41 inches. Humidity is usually moderate with a few humid days occurring during the summer months (NOAA, 1977).

The pathways category of the HARM scoring system includes surface water migration, flooding, and ground water migration routes. Numerical evaluation of these routes involves factors associated with the particular migration route (see App. G). Two meteorological factors used in this evaluation are net precipitation and the 1-year, 24-hour rainfall event. Mean annual evaporation for southern New Hampshire is 26 inches per year (U.S. Dept. of Commerce, 1968); therefore, net precipitation, which is the difference between annual precipitation and evaporation, is approximately 17 inches per year. The 1-year, 24-hour rainfall event is approximately 2.5 inches (U.S. Dept. of Commerce, 1961).

The value of 17 inches per year for net preciitation indicates a significant potential for infiltration as well as surface runoff and the occurrence of permanent surface water features. The 1-year, 24-hour rainfall event of 2.5 inches indicates a significant potential for runoff and erosion. These data indicate that any contamination at NBAFS could migrate significantly by both surface water and ground water pathways.

In January, the daily temperature ranges from an average minimum of approximately 10°F to an average maximum of approximately 31°F. In the warmest period of the year, the July average temperature range is from daily lows of about 57°F to high temperatures near 83°F (NOAA, 1977). Very hot summer weather is infrequent, with the recorded high being 100°F. The recorded low temperature for NBAFS is -25°F.

3.2 GEOGRAPHY

3.2.1 PHYSIOGRAPHY

NBAFS is located in the Merrimack syncline, which forms an extremely hilly and mountainous terrain with many peaks in the vicinity of NBAFS which exceed 1,200 ft MSL in elevation. The developed area of NBAFS is

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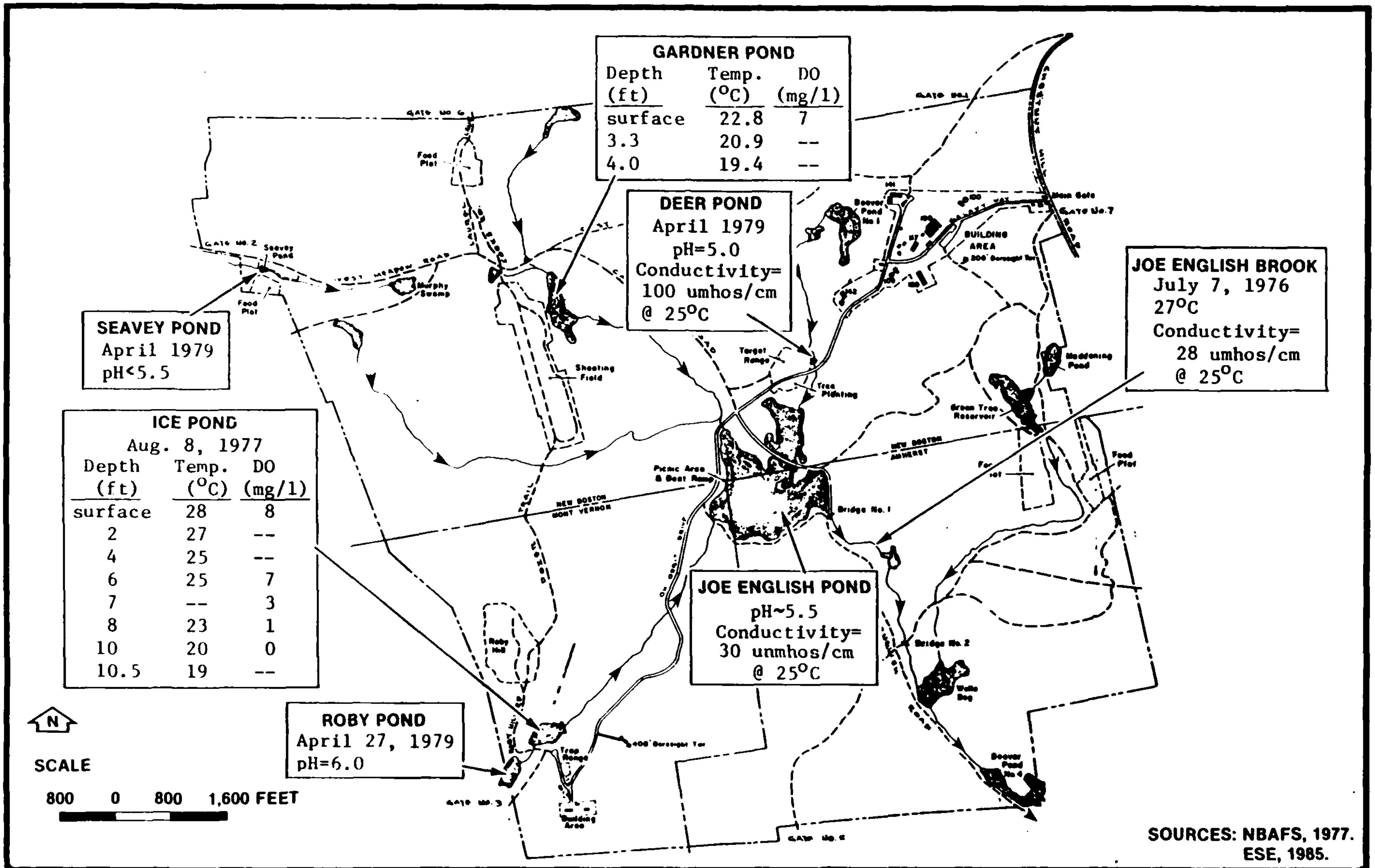

Figure 3.4-1
SURFACE WATER QUALITY AT NBAFS

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contained relatively high ionic content, as evidenced by the conductivity of 205 umhos/cm at 25°, and had a higher pH (6.7) and was therefore not comparable to the Joe English Brook system.

3.4.2 GROUND WATER QUALITY

Potable water at NBAFS is supplied by three active onbase wells (see Sec. 3.3.3 for well locations). The main developed area uses two of these wells (Nos. 1 and 2) for water supply. The third well (No. 3) is used on a seasonal basis for the recreation area.

Available results of analyses performed by the State of New Hampshire Water Supply and Pollution Control Commission and the USAF Occupational and Environmental Health Laboratory (OEHL) (HAFB, 1985; HAFB, 1980; and New Hampshire State Dept. of Health and Welfare, 1985) include a number of health-related National Interim Primary Drinking Water Regulations (NIPDWR) and EPA National Secondary Drinking Water Regulations (NSDWR) parameters. In general, potable water meets the NIPDWR and NSDWR parameter levels according to the available analyses. However, a number of parameter levels have been slightly elevated, as recorded in existing water quality data. Well No. 4 (Bldg. 112), which is inactive, had slightly elevated levels of iron and manganese (see App. F). The highest recorded values were 9.8 mg/l for iron and 1.93 mg/l for manganese. Historically, water quality data for Wells No. 1, 2, and 4 have indicated increasing levels of sodium and chloride in the potable water system. Available data (Tables 3.4-2 and 3.4-3 and Figs. 3.4-2 and 3.4-3) from Wells No. 2 and 4 (inactive) indicate a historical increase in aquifer contamination by chloride. These data suggest the source of well contamination is road salt applied during winter. However, both wells analyzed (Nos. 2 and 4) were located in the vicinity of a salt storage area, which may also have contributed to excessive sodium and chloride levels. In addition, saline boiler blowdown, cooling water discharge, and stormwater runoff are drained upgradient from Well No. 2. The chloride levels are below the NSDWR maximum contaminant level (MCL) of 250 mg/l, except for a single value of

Table 3.4-2. Chloride Concentrations (mg/l) in Well No. 2 at Bldg. 111

Month	1984	1983	1982	1980	1977	1976	1975	1974	1973	1972	1971	1970	1969	1968	1967	1966	1965	1964	1963	1962
Jan.	NA*	NA	NA	NA	100.0	75.0	NA	150.0	52.0	63.0	60.5	46.5	NA	47.0	NA	35.0	35.0	28.5	28.0	NA
																47.0				
Feb.	200.0	NA	NA	NA	NA	NA	NA	98.0	72.0	NA	NA	43.5	37.0	48.5	NA	37.0	31.0	NA	NA	NA
Mar.	159.0	NA	NA	NA	NA	88.0	80.0	82.0	NA	28.0	72.0	39.0	38.5	47.0	45.5	30.5	NA	NA	23.5	NA
Apr.	NA	160.0	NA	NA	170.0	125.0	140.0	84.0	NA	NA	64.5	38.0	40.0	48.5	38.5	33.5	NA	NA	24.5	NA
May	223.0	NA	NA	NA	155.0	130.0	110.0	NA	NA	84.0	NA	NA	33.5	43.5	35.5	45.0	NA	NA	25.5	NA
June	NA	NA	NA	NA	NA	145.0	96.0	94.0	82.0	NA	73.5	NA	NA	49.0	41.5	35.0	NA	NA	27.0	NA
July	NA	NA	191.0	196.0	NA	NA	85.0	NA	NA	90.0	NA	NA	35.0	43.5	44.5	NA	NA	28.0	25.0	NA
Aug.	705.1	NA	NA	NA	NA	NA	NA	58.0	80.0	46.0	NA	NA	34.5	35.5	42.0	45.5	27.0	NA	35.0	NA
Sep.	NA	NA	NA	NA	NA	53.0	120.0	92.0	NA	NA	NA	44.5	NA	33.0	41.5	32.5	NA	NA	20.0	NA
																			13.0	
Oct.	NA	NA	NA	NA	NA	135.0	NA	68.0	64.0	NA	NA	54.0	36.5	33.0	NA	30.5	51.0	NA	19.0	29.0
						90.0													20.0	
Nov.	233.0	NA	NA	NA	NA	NA	NA	76.0	60.2	68.1	46.0	NA	54.0	NA	39.0	35.5	38.0	NA	19.5	NA
Dec.	NA	NA	NA	NA	NA	135.0	99.0	NA	66.0	44.0	NA	NA	NA	NA	NA	NA	NA	NA	26.5	50.5
Total Number of Analyses	5	1	1	1	3	9	7	9	7	7	5	6	8	10	8	11	5	2	13	2
Average	304.0	160.0	191.0	196.0	141.7	108.4	104.3	89.1	68.0	60.4	63.3	44.3	38.6	42.9	41.0	37.0	36.4	28.3	23.6	39.7

NOTE: Data are not available for 1978, 1979, 1981, and 1985.

*NA = Data are not available.

Sources: ESE, 1985.
New Hampshire State Dept. of Health and Welfare, 1985.

Table 3.4-3. Chloride Concentrations (mg/1) in Well No. 4 at Bldg. 112

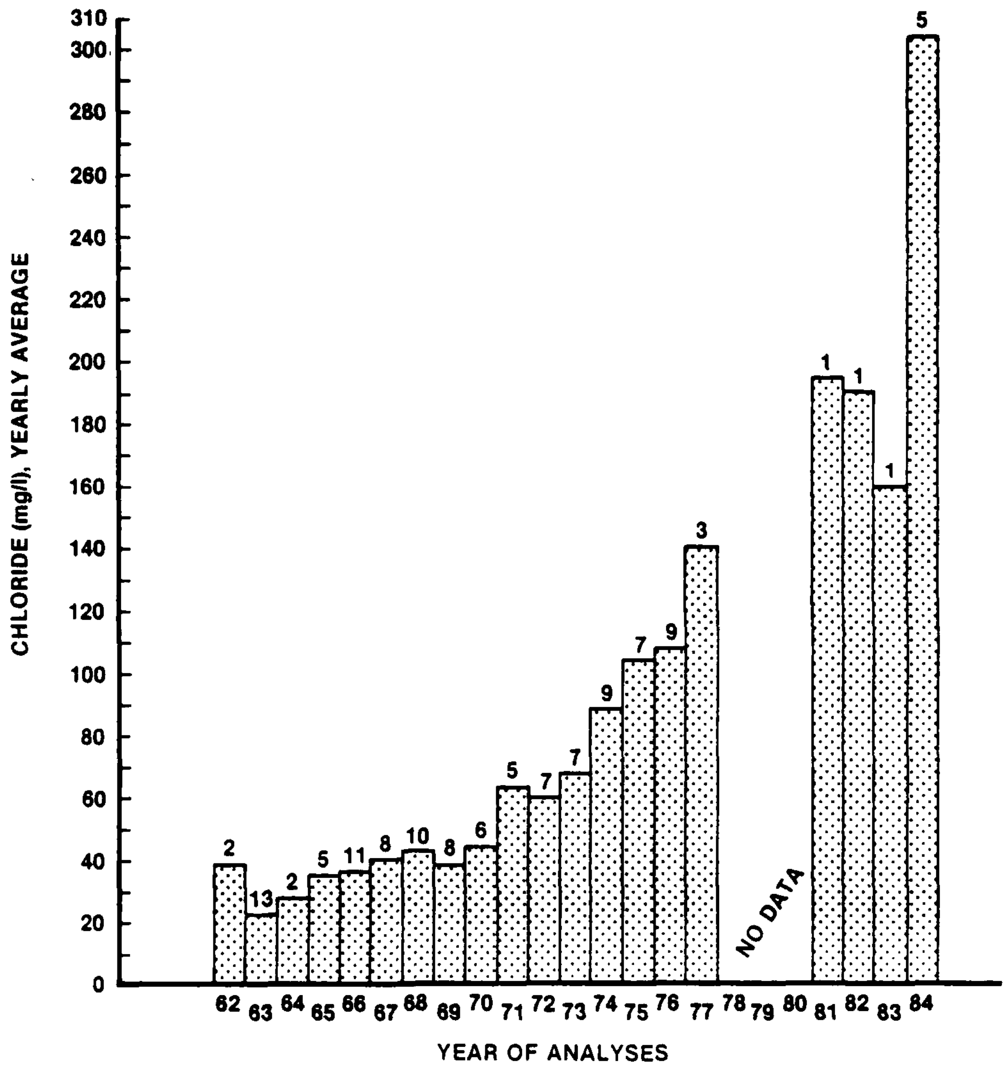
Month	1975	1974	1973	1972	1971	1970	1969	1968	1967	1966	1965	1964	1963	1962
Jan.	NA*	86.0	100.0	85.0	69.5	72.0	50.0	46.0	NA	35.0	30.0 22.5	18.0 19.5	10.0	NA
Feb.	NA	68.0	42.0	NA	NA	70.0	48.0	39.0	NA	41.5	32.5	14.0	12.0	NA
Mar.	120.0	120.0	16.0	NA	50.0	42.0	69.0	41.0	NA	44.5	35.0 10.5	19.0	12.5 13.0	NA
Apr.	62.0	42.0	70.0	NA	NA	65.5	53.5	NA	43.0	41.5	NA	21.0	15.0 13.5	NA
May	76.0	NA	NA	56.0	64.5	62.5	47.5	39.0	35.5	NA	39.0	21.5	12.5	NA
June	50.0	110.0	84.0	NA	60.0	90.0	57.5	NA	NA	25.5	30.0	22.5	14.0	NA
July	63.0	94.0	84.0	30.0	NA	60.0	31.0	50.5	42.0	NA	NA	19.5	13.0	NA
Aug.	111.0	NA	120.0 52.0	78.0	NA	NA	62.0	52.5	42.5	31.0	35.5	22.0	14.0 17.0	8.0
Sep.	94.0	140.0	NA	22.0	62.0	72.0	NA	55.0	NA	36.5	NA	22.5	17.5	6.5
Oct.	78.0	100.0	30.0	NA	NA	54.0	72.0	58.5	NA	41.0	42.5	28.0	NA	8.5
Nov.	NA	92.0	68.0	44.0	68.0	46.5	122.0	NA	38.5	NA	47.5 27.0	28.0	20.0	9.0
Dec.	76.0	86.0	35.0	31.0	92.0	NA	NA	NA	NA	NA	33.0	NA	17.5 19.0	NA
Total Number of Analyses	9	10	11	7	7	10	10	8	5	8	12	12	15	4
Average	81.1	93.8	63.7	49.4	66.6	63.5	61.3	47.7	40.3	37.1	32.0	21.3	14.7	8.0

NOTE: Data are not available for 1976-1985.

*NA = Data are not available.

Sources: ESE, 1985.
New Hampshire State Dept. of Health and Welfare, 1985.

USAFNEWB 2/28/85



SOURCE: ESE. 1985.

Figure 3.4-2
HISTOGRAM OF AVERAGE CHLORIDE VALUES BY YEAR IN WELL NO. 2 (BLDG. 111)

INSTALLATION RESTORATION PROGRAM
NEW BOSTON AIR FORCE STATION

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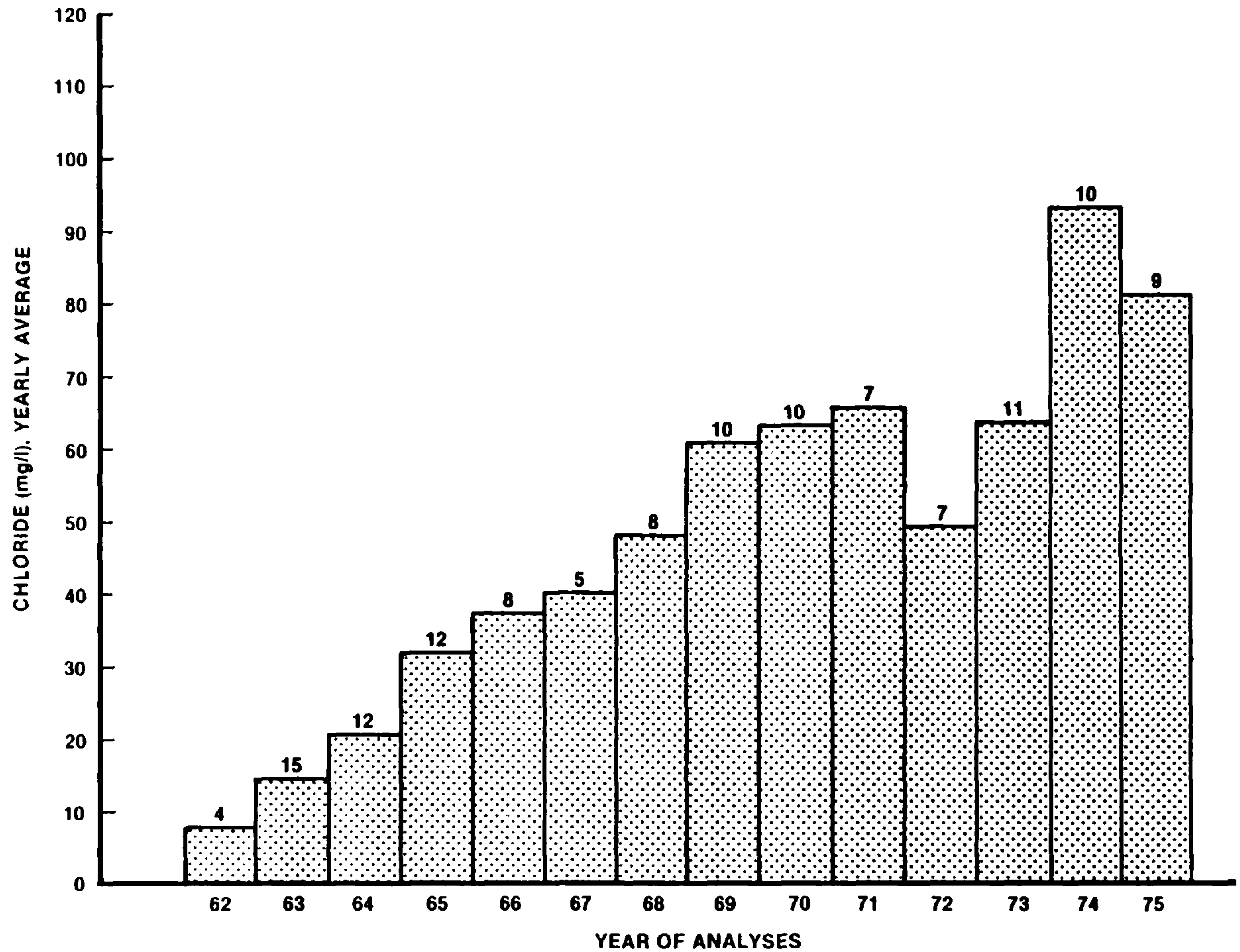

SOURCE: ESE, 1985.

Figure 3.4-3
HISTOGRAM OF AVERAGE CHLORIDE VALUES
BY YEAR IN WELL NO. 4 (BLDG. 112)

INSTALLATION
RESTORATION PROGRAM
NEW BOSTON AIR FORCE STATION

705 mg/l for Well No. 2 in May 1984. This value is so high as to suggest that it might be an erroneous result. It pulls the 1984 average for Well No. 2 above 250 mg/l. The increased chloride trend is evident even discounting this potentially questionable result.

Because of the rise in chloride content, sodium concentrations have been measured since 1980 (see App. F). Concentrations in the potable water in Wells No. 1 and 2 ranged from 48 to 103 mg/l (see Table 3.4-4) Well No. 3, which is in an area receiving little road salt runoff, contained sodium concentrations of 8.0 to 13.5 mg/l. No New Hampshire or Federal criteria for sodium exist, and sodium at the observed levels at NBAFS poses no risk to the general population (NRC/NAS, 1977). In general, dietary intake of sodium is more than 10 times the intake from drinking water which contains less than 200 mg/l sodium. It has been recommended, however, (NRC/NAS, 1977) that persons with hypertension restrict intake of sodium to less than 500 milligrams (mg)/day. For such persons, maximum recommended sodium content in drinking water is 20 mg/l (NRC/NAS, 1977). Because of this, a memo has been issued and warning signs placed at potable water sources in Bldg. 100 indicating that sodium levels are greater than those recommended for persons on sodium-restricted diets.

Available water quality data for potable Well No. 3 indicate generally good quality water, except for slightly elevated iron and manganese levels (see App. F). Analyses indicate no detectable pesticides, and gross alpha radioactivity levels are in compliance with radioactivity standards (see App. F).

Results of one analysis for organic contaminants in the potable water system were available (HAFB, 1980) (App. F). Results of a sample collected in June 1980 indicated a concentration of 1.2 micrograms per liter (micrograms/l) of trichloroethylene (TCE) in Well No. 2, no detectable amount in Well No. 1, and a trace in the water distribution system. No followup analyses were performed on the well because the

Table 3.4-4. Sodium Levels in Potable Water at NBAFS

Location	Sodium Concentration (mg/1) on: July 9, 1980	Feb. 3, 1983	April 18, 1983	Feb. 28, 1984
Well No. 1 (PW-1)	87.3	52.5	56.4	55.0
Well No. 2 (PW-2)	71.9	48.5	56.4	72.0
Well No. 3 (PW-3)	NA*	12.0	8.8	8.0
	Sodium Concentration (mg/1) on: March 16, 1984	May 4, 1984	Aug. 30, 1984	Nov. 21, 1984
Well No. 1 (PW-1)	58.7	71.7	58.2	56.9
Well No. 2 (PW-2)	75.2	75.1	74.5	102.8
Well No. 3 (PW-3)	7.6	8.1	7.9	13.5

*NA = Data not available.

Sources: Dept. of the Air Force, 1984.
ESE, 1985.

value was below applicable criteria at that time. TCE was commonly used as a cleaning solvent in the 1960s and early 1970s; however, available records do not indicate that the compound was used at NBAFS.

TCE is one of the 64 toxic organics for which Federal criteria were later promulgated in November 1980 (EPA, 1980). TCE has not been documented to be a potential carcinogen or mutigen but causes liver, kidney, and central nervous system damage in mammals. Based on acceptable daily intake (ADI), the proposed MCL is 30 micrograms/l (EPA, 1984) in drinking water. Based on inconclusive evidence of the carcinogenic properties of TCE, however, a proposed risk level of increasing cancer morbidity by one case per 10^6 population is a concentration of 2.8 micrograms/l (EPA, 1984). The EPA 1980 criterion was 2.7 micrograms/l for a similar risk level. The observed TCE concentration was less than half of this value. Low concentrations of the volatile halocarbons are often subject to positive bias because of solvents present in laboratory atmospheres and contamination introduced during sample handling. The reliability of conclusions based on single analyses which report halocarbons at levels of 1 to 2 micrograms/l and below is low because of this factor. No imminent human-health threat is suggested by the 1.2-micrograms/l concentration of TCE observed in Well No. 2 because the TCE concentration observed is the applicable Federal water quality criteria. Secondly, no personnel are permanently quartered at NBAFS; therefore, NBAFS is not used as the sole source of potable water. Because of the sodium concentrations previously discussed, bottled potable water is provided.

Recommendations regarding additional monitoring are presented in Sec. 6.0.

Review of existing bacteriological data (1962-1984) on file with the Civil Engineering Section at NBAFS indicates acceptable levels of coliform (NBAFS, 1984b). Reported coliform colonies have been minor and infrequent during the period of recorded analyses and do not violate state or Federal drinking water standards.

3.5 BIOTIC COMMUNITIES

NBAFS is located in southern New Hampshire near the maximum southern extent of the Northern Hardwoods-Spruce Forest Ecoregion of the Laurentian Mixed Forest physiographic province (FWS, 1979).

Major land use types found on NBAFS are upland forest, hardwood swamp, freshwater marsh, natural and manmade ponds, and developed land.

Developed lands include buildings and associated grounds, roads, parking lots, and cleared rights-of-way. Semi-improved lands support recreation activities such as camping, and several fields are maintained as wildlife forage areas. These areas comprise approximately 125 acres, or 4.4 percent, of the area of NBAFS. The remainder of the station is mainly undeveloped areas which have grown into mature coniferous, deciduous, and mixed forests. According to forestry surveys performed by NBAFS, coniferous forests are predominant and are composed of white pine (Pinus strobus) and Eastern hemlock (Tsuga canadensis).

Hardwood forests occupy approximately one-third of the forested area on NBAFS. According to surveys made by NBAFS, red oak (Quercus rubra) is the dominant broadleaf tree present, but several other species add to the diversity of the forest communities. These include: sugar maple (Acer saccharum), red maple (Acer rubrum), paper birch (Betula papyrifera), black birch (Betula lenta), yellow birch (Betula alleghaniensis), gray birch (Betula populifolia), aspen (Populus spp.), white ash (Fraxinus americana), black gum (Nyssa sylvatica), and black cherry (Prunus serotina). Forested lands represent a major wildlife resource for Virginia white-tailed deer (Odocoileus virginianus), bobwhite (Colinus virginianus), ruffed grouse (Bonasa umbellus), and a diverse assemblage of migratory and permanent nongame species.

Because of greatly sloping relief, drainage basins are well defined on NBAFS. For this reason, wetlands account for only a small area of the station. The few wetlands present are seasonally flowing streams, swamps, marshes, and ponds. Wooded swamps are dominated by red maple, and freshwater marshes support cattail (*Typha* sp.), buttonbush (*Cephalanthus occidentalis*), and cranberry. Several ponds and one stream are managed for recreational fishing. Management is based on a comprehensive plan developed in a cooperative effort by the USAF, U.S. Fish and Wildlife Service (FWS), and New Hampshire Fish and Game Dept. Game fish found to be present in NBAFS waters include the following species (FWS, 1980):

Brook trout	*Salvelinus fontinalis*
Rainbow trout	*Salmo gairdneri*
Largemouth bass	*Micropterus salmoides*
White sucker	*Catostomus commersoni*
Yellow perch	*Perca flavescens*
Chainpickerel	*Esox niger*
Brown bullhead	*Ictalurus nebulosus*
Pumpkinseed	*Lepomis gibbosus*
Creek chubsucker	*Erimyzon oblongus*
Golden shiner	*Notemigonus crysoleucas*
Stonecat	*Noturus insignis*
American eel	*Anguilla rostrata*

Several state-protected and Federally protected species are expected or known to occur within the NBAFS boundaries. These include:

Bald eagle	*Haliaeetus leucocephalus*	Observed but not known to nest
Indiana bat	*Myotis sodalis*	Expected to occur
Common loon	*Gavia immer*	Observed
Cooper's hawk	*Accipiter cooperii*	Observed
Marsh hawk	*Circus cyaneus hudsonius*	Observed
Red-shouldered hawk	*Buteo lineatus*	Observed
Osprey	*Pandion haliaetus carolinensis*	Observed
Upland plover	*Bartramia longicauda*	Observed

Whippoorwill	Camprimulgus vociferus	Expected to occur
Purple martin	Progne subis subis	Observed
Eastern bluebird	Sialia sialis	Observed
Pine marten	Martes americana	Observed
New England cottontail rabbit	Sylvilagus transitionalis	Observed

The eastern box turtle, classified as rare, may also occur in the area.

The extent to which these species use resources on NBAFS is not known. Currently, bluebird nest boxes are being erected in suitable habitat to increase bluebird populations. Brush piles are being constructed to increase protective cover for the rare New England cottontail rabbit. Future wildlife management activities are expected to be undertaken to aid additional protected species where possible.

3.6 ENVIRONMENTAL SETTING SUMMARY

The station is situated in the south-central portion of New Hampshire in the Merrimack River Basin of the Merrimack syncline. The developed area of NBAFS is mainly situated on the northern facing slope of Chestnut Hill, one of three major topographic highs within the installation boundary. Elevations at NBAFS vary from approximately 350 ft MSL along Joe English Brook to 1,288 ft MSL on top of Joe English Hill. Physiographically, the station is located in a bowl-shaped depression centered at Joe English Pond, with upland ridges at the installation boundaries forming the lips of the bowl. The major drainage features on NBAFS are Joe English Pond, situated in the center of the installation; a series of 14 upland ponds and wetland areas; and Joe English Brook, which flows offbase to the southeast into the Amherst Conservation District. Other streams on NBAFS include those flowing to Joe English Pond from the upland wetland areas of Murphy Swamp, Gardner Pond, Beaver Pond, Deer Pond, and Ice Pond.

Soils on NBAFS consist of very strong, fine sandy loams, with variable amounts of large stones and coarse sand. These soils usually occur as a thin veneer consisting of a loam matrix with many large boulders, cobbles, and pebbles over the highly fractured and jointed bedrock unit. These soils are considered highly permeable and would be susceptible to infiltration by contaminants.

Based on the very limited data from a single study, surface water characteristics at NBAFS indicate low concentrations of dissolved solids (generally <30 umhos/cm conductance at 25°C) and acidic pH (pH 5 to 6). In the area receiving drainage from the developed areas (Areas A and B), a higher value for conductivity (100 umhos/cm at 25°C) was observed in Deer Pond. No firm conclusion can be drawn from a single set of measurements; however, the high conductivity in Deer Pond suggests the possibility of impact from road salt runoff from the paved areas.

A single aquifer system is found beneath NBAFS; this system occurs within the fractured metamorphic and metasedimentary rock units. The potentiometric surface of the aquifer generally conforms to the topographic gradient with ground water flow from topographically high areas to topographically low areas. In the low-lying areas on NBAFS, near Joe English Pond, the aquifer system is under artesian conditions. Recharge to the aquifer occurs primarily through local surface infiltration of precipitation in the outcrop areas. Discharge from the aquifer occurs through upward leakance and well withdrawal.

A historical increase in chlorides has been observed in Wells No. 1 and 2, located in areas receiving significant quantities of runoff contaminated by road salt in winter. Because of the high permeability of the shallow, coarse soils and infiltration capacity of the fractured bedrock, such runoff may easily impact the aquifer locally.

Average annual rainfall at NBAFS is approximately 43 inches, with average annual snowfall approximately 41 inches. The mean annual lake evaporation rate in the vicinity of NBAFS is 26 inches. Therefore, the net annual precipitation rate for NBAFS (rainfall minus evaporation) is 17 inches. Average monthly temperatures range from 22.6°F in January to

69.8°F in July. The 1-year, 24-hour rainfall event is approximately 2.5 inches.

The value of 17 inches per year for net precipitation indicates a significant potential for infiltration as well as surface runoff and the occurrence of permanent surface water features. The 1-year, 24-hour rainfall event of 2.5 inches indicates a significant potential for runoff and erosion. These data indicate that any contamination at NBAFS could migrate significantly by both surface water and ground water pathways.

NBAFS is situated near the southern edge of the Northern Hardwoods-Spruce Forest Ecoregion of the Laurentian Forest physiographic province. Only about 28 percent of the station consists of developed or semideveloped land. The remainder is dominated by forest composed mainly of white pine and eastern hemlock. Red oak is the dominant hardwood species. Fourteen ponds and 7.1 miles of stream/wetland habitat occur on NBAFS. A fisheries management program includes stocking of brook trout and rainbow trout as well as management for production of warm-water centrarchid game fish.

Several threatened and endangered species are known to occur on NBAFS and in the area. The bald eagle is the only endangered species reported on NBAFS; however, the osprey, red-shouldered hawk, and whippoorwill are considered threatened. The Eastern box turtle, classified as rare, may occur in the area.

As a result of the geohydrological environment and soil characteristics, conditions on NBAFS are conducive to migration of contaminants if introduced into the environment. Potential contaminant migration could occur laterally and vertically through the fractured bedrock to the underlying aquifer system. Mobile contaminants in the vicinity of Joe English Pond may additionally migrate toward surface water channels and could potentially contaminate the surface water system, which flows offbase and ultimately is used as a potable water source.

Table 4.1-3. NBAFS Pesticides Inventory

Pesticide	Active Constituent	Quantity*	EPA Regulation Number
<u>Insecticides</u>			
Ficam W®	2,2-dimethyl 1,3-benzodioxyl-4-ol methylcarbamate	8 ounces (oz)	45639-1
Insect Repellant	N,N-Diethyl-meta-toluamide	24 oz	901KS-1
Aerosol Synergized Pyrenthrins	3-(2-methylpropenyl)cyclopropane-carboxylate	72 oz	901-79
B-Gone® Wasp Spray	(5-Benzyl-3-furyl)methyl 2,2-Dimethyl-3(2-methylpropyl) cyclopropane carboxylate	140 oz	7405-44
Allstar® Roach Killer	Orthrobic acid	40 oz	43357-1
Liquid Seven	1-Naphthyl-N-Methylcarbamate	12 gal	Not available
<u>Rodenticides</u>			
Warafin Anticoagulent Bait	3-(α-acetonylbenzene)-4-hydroxy-coumarin	15 pounds (lb)	7273-132
All-Weather Bail Blocks	Diphacinone	20 lb	56-44

*Quantity noted during onsite survey.

Sources: ESE, 1985.
NBAFS, 1984d.
NBAFS, n.d.

have been performed by Roads and Grounds personnel. The NBAFS Pesticide Management Plan (NBAFS, 1984d) includes a description of these functions; an itemized list of pesticides used; and a list of required safety equipment used in mixing Ficam W®, a pesticide used to kill ants and roaches. An inventory of pesticides applied at NBAFS is presented in Table 4.1-3. Forms DD1532 are available for inspection. NBAFS uses only EPA-registered pesticides. Herbicides have not been used for vegetation control at NBAFS.

Pesticides are stored at Roads and Grounds (Bldg. 117) in an enclosed, well-marked cabinet. A wall-mounted eye-wash station is located in the pesticide shop, and a water faucet with hose is located immediately adjacent to the shop. No berm exists, as required by Federal regulation (EPA, 1982) for the storage and mixing area, and no backflow prevention device is fitted to the faucet. In addition, the mixing area has four underground floor drains which empty to the storm drainage system. Ficam W® is mixed at the shop and used as a residual liquid spray. The pesticide applications are performed by a state-licensed certified applicator. As a safety precaution, no more than 2 gal are mixed at a time. Empty pesticide containers are triple-rinsed and disposed of as ordinary refuse. Rinse waters from this procedure are used as dilution water in subsequent batches of Ficam W®.

The NBAFS Pesticide Contingency Spill Plan (NBAFS, n.d.) provides specific instructions to be followed in the event of a pesticide spill. The plan includes a notification list, spill emergency procedures, post-spill procedures, and a list of equipment (e.g., respirators, absorbent material) necessary to execute the requirements of the plan. There was no record found of pesticide spills at the installation.

Prior to 1975, pesticide application was done by an outside contractor. Empty containers were rinsed and disposed of as trash. From 1960 to 1975, DDT was used periodically for control of biting insects. No stocks of DDT were maintained at NBAFS because the DDT was applied by an

Table 4.1-2. **NBAFS Laboratory Operations--Waste Generation**

Shop Name	Location (Bldg. No.)	Waste Material	Waste Quantity (gal/yr)*	Waste Management Practices (1950–1980)
1. Quality Control Laboratory	100	Test kit solvents (petroleum, xylene, freon, alcohol based)	2	Onsite landfill (1960–1968); Contract disposal (1968–present)
2. PMEL	100	Cleaning solvents, rags (petroleum, xylene, alcohol, freon-based solvents)	2	Onsite landfill (1960–1968); Contract disposal (1968–present)
		Cathode ray tubes	2 units/yr	Onsite landfill (1960–1968); Contract disposal (1968–1982); Ft. Devens DPDO (1982–present)
	100	Batteries and metal scrap		Ft. Devens DPDO (1960–present)
3. Photography Laboratory	100	Developing/ fixing solutions	Unknown, <20	Neutralized and discharged to sanitary sewer (1960–1965)
		Rinse water	Unknown, <100	Neutralized and discharged to sanitary sewer (1960–1965)

*Unit of measurement is gal/yr unless indicated otherwise.

Key:

______ Confirmed timeframe and disposal data from FACC personnel.

------ Estimated timeframe and disposal data from FACC personnel.

Source: ESE, 1985.

4.1.2 LABORATORY ACTIVITIES

Laboratory operations at NBAFS are performed by the PMEL and the quality control (QC) laboratory. From 1960 to 1965, a photographic laboratory was operated by Lockheed Aerospace Corp. Laboratory waste generation and disposal methods are summarized in Table 4.1-2. The operations are briefly described in the following paragraphs. All laboratory operations have been housed in Bldg. 100.

Precision Measurement Equipment Laboratory

The PMEL is used for calibration and repair of test equipment. Waste solvent (2 gal/yr) from cleaning of small parts and equipment is absorbed with rags and contract disposed. Cathode ray tubes (2/yr) are now sent to the Ft. Devens DPDO. From 1968 to 1982, these tubes were contract disposed. Before 1968, all of these wastes were placed in an onsite landfill.

Quality Control Laboratory

An antistatic kit used in the QC Laboratory generates small quantities of solvent wastes (isopropyl alcohol, freon, xylene, petroleum-based epoxy, and grease). These wastes (2 gal/yr) are contained in small vials or absorbed with rags and contract disposed. Until 1968, these solvents were placed in an onsite landfill.

Photography Laboratory

A photography laboratory was operated from 1960 to 1965 in Bldg. 100 (Room 140A) by Lockheed Aerospace Corp., the STC contractor. Reportedly, this laboratory received light use and operated only sporadically. Waste developing solutions and rinse water quantities were small (see Table 4.1-2). No silver recovery was practiced during operation of the photography laboratory.

4.1.3 PESTICIDE HANDLING, STORAGE, AND DISPOSAL

Pesticides are used at NBAFS to maintain grounds and structures and to prevent pest-related problems. Since 1975, pest management functions

4.1.1.2 DET. 1, 2014th COMMUNICATIONS SQUADRON

SATCOM FACILITY ANTENNA MAINTENANCE SHOP

The SATCOM Facility Antenna Maintenance Shop (Bldg. 142) began operation in 1978. Wastes generated from routine maintenance include ethylene glycol (45 gal/yr), gearbox oil (50 gal/yr), and small quantities of cleaning solvents. Ethylene glycol is poured on the ground adjacent to the building. The waste oil is drummed, placed in the waste oil tank at the Motor Pool, and then contract disposed. Excess cleaning solvents are wiped onto rags and contract disposed.

4.1.1.3 CONTRACTORS

FORD AEROSPACE AND COMMUNICATIONS CORPORATION

Antenna Maintenance

Wastes generated from the routine maintenance of two antennas (Bldgs. 106 and 108) include ethylene glycol (100 gal/yr), waste oil from gearbox changes (120 gal/yr), hydraulic fluid (25 gal/yr), and solvents (5 gal/yr). The waste ethylene glycol is placed in a drum at the Motor Pool and contract disposed. Before 1974, ethylene glycol was drained onto the ground. The waste oil and hydraulic fluid are drummed, sent to the Motor Pool storage areas, and then contract disposed. It was reported that before 1974, the waste oil and fluid were hauled to Grenier AFB and used in firefighter training exercises. Waste solvent (nonflammable) is absorbed with rags and contract disposed. Until 1968, waste solvent was placed in an onsite landfill.

SPERRY CORPORATION

Since 1972, the Sperry Corp. has provided maintenance and technical support services for the computer systems located at remote tracking stations and at the Satellite Test Center (STC). Specific tasks include maintenance on computers, teletypes, printers, and disk drives. Wastes generated include isopropyl alcohol (10 gal/yr), which is absorbed with rags and contract disposed.

USAF police until 1972. Since then, security has been provided by contract.

LOGISTICS BRANCH

Motor Pool

The Motor Pool (Bldg. 141) performs maintenance on approximately 30 installation vehicles. Activities range from minor tuneups to engine or transmission repair. Body work and large-scale maintenance are contracted to local mechanics. Prior to 1974, all motor vehicle maintenance and repair for NBAFS were conducted at Grenier AFB, and no motor pool existed at NBAFS. Motor pool waste quantities generated in support of NBAFS activities would have been similar to those described below for the current NBAFS Motor Pool. Wastes generated from Motor Pool activities include brake shoes (variable quantity), waste oil (200 gal/yr), antifreeze (30 gal/yr), hydraulic fluid (30 gal/yr), petroleum degreasing solvent (10 gal/yr), battery acid (20 gal/yr), and battery casings (5/yr). The used brake shoes are returned to the vendor. Waste oil is placed in a 1,000-gal underground tank and then contract disposed. Waste antifreeze, hydraulic fluid, and degreasing solvent are segregated into drums and then either contract disposed or sent to the Ft. Devens DPDO. Until 1982, these wastes were combined and placed in a waste oil tank before contract disposal. The solvent used by the Motor Pool is a nonflammable, petroleum-based solvent containing no chlorinated hydrocarbons. Waste battery acid is neutralized with sodium bicarbonate and discharged to the storm sewer. The battery casings are sent to Ft. Devens DPDO.

EMERGENCY SERVICES BRANCH

Auto Hobby Shop

Waste lube oil (variable quantity) from the Auto Hobby Shop (Bldg. 141) is collected in drums, taken to the Motor Pool, placed in an underground tank, and contract disposed. Waste hydraulic fluid is placed into designated waste drums. No large-scale maintenance is performed at this shop, which has operated since 1979.

in small quantities to clean electrical parts. Sleeve/bearing oil is used for lubrication. Both of these wastes (5 gal/yr) are wiped onto rags and contract disposed. Until 1968, these wastes were placed in an onsite landfill.

Sewage Treatment Plant

The sewage treatment plant (Bldg. 121) was constructed in 1962, replacing several temporary septic tank systems installed in 1960. The plant is an extended aeration system which includes two 13,000-gallon(gal)-capacity twin units. The effluent is permitted by NPDES Permit NH0090077. Chlorine is added to the discharge for disinfection prior to release to Beaver Pond. The discharge (2,400 gpd) is monitored for pH, 5-day biochemical oxygen demand (BOD_5), total suspended solids, and coliform by Chemserve in Milford, N.H. Typical BOD_5 reduction is greater than 90 percent; however, reductions below 50 percent have been reported. Sludge (variable quantity) from the plant is routed to a nearby leaching field, which is periodically cleaned by an outside contractor. The contractor also cleans the two septic tanks used by the Fire Station (Bldg. 103) and the Space Ground Link System Receiver Building (Bldg. 106).

Plumbing Shop/Carpentry Shop

Personnel in the Plumbing Shop (Bldg. 117) repair leaking pipes and water closets and perform other recurring maintenance. The only waste generated is a small amount of cutting oil (variable quantity) which is evaporated or absorbed with rags and contract disposed. Until 1968, waste cutting oil was placed in an onsite landfill. Carpentry Shop (Bldg. 117) personnel repair doors, install sheetrock and moulding, and perform other small-scale maintenance of facilities. Liquid wastes are not generated from these activities.

SECURITY POLICE

The Security Police (Bldg. 101) use less than 5 gal/yr of rifle bore cleaner, which is absorbed with rags and contract disposed. Until 1968, the rags were placed in an onsite landfill. Security was provided by

1974, waste lube oils were placed in the No. 5 fuel oil tank and burned in the boilers. The excess thinner is absorbed with rags and contract disposed. Until 1968, the rags were placed in an onsite landfill.

Paint Shop

The Paint Shop (Bldg. 124) generates excess paint (30 gal/yr) and paint thinner (30 gal/yr) as waste. Thinners used in the Paint Shop include xylene; however, thinners containing chlorinated hydrocarbons were not found. Shop personnel reported these wastes are temporarily stored in the waste drums located at the Motor Pool or in a trash dumpster and then contract disposed. Until 1974, the wastes were disposed of in a dumpster or in an onsite landfill.

Roads and Grounds

Tasks performed by Roads and Grounds (Bldg. 117) include snow removal, ice control, application of pesticides and rodenticides, erosion control, and minor repair of mowers and equipment. Efforts have been initiated to reduce the quantity of road salt used in snow-removal operations. The current estimated use of road salt is 38 tons/yr, a significant reduction from 50 tons/yr estimated to have been used in previous years. Road salt enters the storm drainage system through snowmelt and runoff. The impact of runoff from this operational practice is discussed further in Sec. 4.2.1. The application of pesticides at NBAFS is discussed in Sec. 4.1.3.

Electrical Shop

Routine activities by the Electrical Shop (Bldg. 117) are the installation and repair of equipment such as floor buffers, fluorescent fixtures, well pumps, and fire and intrusion systems. Public Service System of New Hampshire and Concorde Transformer Company perform all maintenance and repair of electrical distribution and substations. PCB storage and handling and disposal are described in Sec. 4.1.4. Tritium smoke detectors (1/yr) which are removed from service are taken to the Ft. Devens DPDO. A light aliphatic hydrocarbon solvent (SS25) is used

4.1.1 INDUSTRIAL OPERATIONS

4.1.1.1 DET. 2, AIR FORCE SATELLITE CONTROL FACILITY

CIVIL ENGINEERING

Mechanical Shop/Boiler Room

Two boilers (hot water and steam) are operated in the Mechanical Shop (Bldg. 100) to provide hot water and humidification to the Headquarters Building. Most outlying building boilers are hot-water systems and/or closed-steam systems which require only periodic inspection for chemical residuals and have no waste discharge. Wastes generated from the Bldg. 100 shop include boiler blowdown containing water-conditioning chemicals (4,000 gpd), refrigerant and compressor lube oils (40 gal/yr), thinner (5 gal/yr) absorbed with rags, and resin regeneration salt (240 lb/yr). The boiler blowdown and waste resin salt are combined with cooling water and discharged to a storm drain, which is permitted as Outfall 002 of National Pollutant Discharge Elimination System (NPDES) Permit NH0090077. This drainage point is reported by shop personnel to be in compliance with NPDES requirements. Available analyses (App. F) indicate that copper (120 micrograms/l), iron (720 micrograms/l), manganese (220 micrograms/l), zinc (550 micrograms/l), calcium (61.3 mg/l), magnesium (12.1 mg/l), potassium (6.1 mg/l), and sodium (186 mg/l) are elevated above background levels. None of these metals (including copper and zinc) would be expected to cause adverse impacts after dilution in the receiving system. These discharges are further discussed in Sec. 4.2.1. Boiler blowdown chemicals in use are biodegradable and include the following:

1. Inhibitor--BETZ® ENTEC 338 (nonchromate-borate-nitrite-based corrosion inhibitor),
2. Dispersants--BETZ® ENTEC 717 (polymeric antifoam agent) and BETZ® ENTEC CPSIV (polyphosphate),
3. Corrosion control--BETZ® ENTEC 741 (neutral amine),
4. Oxygen scavenger--Mogul® 301 (sulfite), and
5. pH adjustment (sodium hydroxide).

The waste lube and refrigerant oils are temporarily stored in an underground tank at the Motor Pool and then contract disposed. Until

Table 4.1-1. NBAFS Industrial Operations--Waste Generation (Continued, Page 3 of 3)

Shop Name	Location (Bldg. No.)	Waste Material	Waste Quantity (gal/yr)*	Waste Management Practices (1950, 1960, 1970, 1980)
		Hydraulic fluid	Variable	Contract disposal
II. DET. 1, 2014TH COMMUNICATIONS SQUADRON-- SATCOM Facility Antenna Maintenance	142	Ethylene glycol	45	Poured on ground onsite
		Gearbox oil	50	Contract disposal
		Cleaning solvents (petroleum based)	5	Contract disposal
III. CONTRACTORS				
A. FACC Antenna Maintenance	106, 108	Ethylene glycol	100	Drained on ground; Contract disposal
		Gearbox oil	120	Hauled to Grenier AFB; Contract disposal
		Hydraulic fluid	25	Hauled to Grenier AFB; Contract disposal
		Solvents, rags	5	Onsite landfill; Contract disposal
B. SPERRY CORP.	100	Isopropyl alcohol, rags	10	Contract disposal

*Unit of measurement is gal/yr unless indicated otherwise.

Key:

______ Confirmed timeframe and disposal data from shop personnel.

------ Estimated timeframe and disposal data from shop personnel.

Source: ESE, 1985.

Table 4.1-1. NBAFS Industrial Operations--Waste Generation (Continued, Page 2 of 3)

Shop Name	Location (Bldg. No.)	Waste Material	Waste Quantity (gal/yr)*	Waste Management Practices (1950–1980)
		Aliphatic hydrocarbon, solvent, lube oil	5	Onsite landfill (c. 1960–1966); Evaporation or contract disposal (c. 1966 →)
		Batteries	50 units/yr	Sent to Ft. Devens DPDO (c. 1966 →)
4. Sewage Treatment Plant	121	Sludge	Variable	- - - - Contract disposal (c. 1962 →)
5. Plumbing Shop/ Carpentry Shop	117	Cutting oil	Variable	Onsite landfill (c. 1960–1966); Evaporation or contract disposal (c. 1966 →)
B. Security Police	101	Rifle bore cleaner	<5	Onsite landfill (c. 1960–1966); Evaporation or contract disposal (c. 1966 →)
C. Logistics Branch--Motor Pool	141	Brake shoes	Variable	Returned to vendor (c. 1977 →)
		Waste oil	200	Contract disposal (c. 1977 →)
		Antifreeze	30	Contract disposal or sent to Ft. Devens DPDO (c. 1977 →)
		Hydraulic fluid	30	Contract disposal or sent to Ft. Devens DPDO (c. 1977 →)
		Degreasing solvent (petroleum based)	10 10	Contract disposal or sent to Ft. Devens DPDO (c. 1977 →)
		Battery acid	20	Neutralized and discharged to storm sewer (c. 1977 →)
		Battery casings	5 units/yr	Sent to Ft. Devens DPDO (c. 1977 →)
D. Emergency Services Branch--Auto Hobby Shop	141	Lube oil	Variable	Contract disposal (c. 1980 →)

Table 4.1-1. NBAFS Industrial Operations--Waste Generation

Shop Name	Location (Bldg. No.)	Waste Material	Waste Quantity (gal/yr)*	Waste Management Practices (1950–1980)
I. DET. 2, AIR FORCE SATELLITE CONTROL FACILITY				
A. Civil Engineering				
1. Mechanical Shop/ Boiler Room	100	Boiler blowdown (diluted borate/ nitrite corrosion inhibitor, antifoaming agent, polyphosphate, sulfite oxygen scavenger, neutral amine, and sodium hydroxide)	4,000 gallons per day (gpd)	Discharged to storm sewer
		Refrigerant oil, lube oils	40	Used as heating fuel | Contract disposal
		Thinner (petroleum based, xylene)	5	Onsite landfill | Evaporation or contract disposal
		Resin salt (sodium chloride)	240 pounds per year (lb/yr)	Diluted and discharged to storm sewer
2. Paint Shop	124	Excess paint	30	Dumpster or onsite landfill | Contract disposal
		Thinner (petroleum based, xylene)	30	Dumpster or onsite landfill | Evaporation or contract disposal
3. Electrical Shop	117	Tritium smoke detectors	1 unit/ year (yr)	Sent to Ft. Devens Defense Property Disposal Office (DPDO)

solvents; and radiological materials are handled. No large-scale product-manufacturing operations have been conducted at NBAFS. The industrial operations described in this section are primarily maintenance-support functions provided for NBAFS facilities, ground vehicles, and the communication facilities engaged in the station's primary mission.

No industrial operations were reported for the site during its use by Grenier AFB as a bombing range from 1942 to 1958. The only facility on record during that period was an observation tower which was demolished about 1960, when the first tracking facilities at NBAFS were constructed.

Industrial activities from the tracking station operation have remained essentially the same since its startup in 1960, except for the addition of the Motor Pool in 1974. Because historical levels of activity have remained consistent with current levels, current waste types, and generation rates, locations are assumed to be representative of historical activity. Because of the small amounts of hazardous waste generated and the promulgations of Federal regulations controlling hazardous material in the late 1970s, waste disposal practices have gradually shifted from the onsite disposal of wastes by incineration and landfilling to the offsite contract hauling of wastes. (Waste disposal, hazardous or otherwise, that is handled by contract will be referred to as "contract disposal" throughout this report.) Currently, the contract for solid waste disposal is held by C&S Disposal Contractors, Inc., Hudson, N.H. (NBAFS, 1984c).

App. E contains a list of shops operating on NBAFS. As a consequence of the unchanged mission of the station, current shop locations are identical to past locations. A summary of waste generation from industrial operations is presented in Table 4.1-1. Industrial shops, activities, and waste treatment, storage, and disposal are described in the following paragraphs.

4.0 FINDINGS

To assess hazardous waste management at NBAFS, past activities of waste generation and disposal methods were reviewed. This section contains a summary of hazardous wastes generated, descriptions of waste disposal methods, identification of the disposal sites onbase, and evaluation of the potential for environmental contamination.

4.1 CURRENT AND PAST ACTIVITY REVIEW

To identify past activities that resulted in generation and disposal of hazardous waste, current and past waste generation and disposal methods were reviewed. This activity consisted of a review of files and records, interviews with current and former base employees, and site inspections.

On Nov. 8, 1984, an inspection of NBAFS was conducted by personnel from the New Hampshire Office of Waste Management. From this inspection, it was determined that NBAFS is not a generator of hazardous waste by current New Hampshire standards (New Hampshire Dept. of Health and Welfare, 1984). Subsequent to this determination, on Dec. 4, 1984, the New Hampshire Division of Public Health Services submitted a recommendation to EPA Region I that NBAFS should be declassified from generator status (New Hampshire Dept. of Health and Welfare, 1984). A copy of a letter indicating this recommendation is presented as App. K.

NBAFS operations described in this section are those which handle, store, or dispose of potentially toxic or hazardous materials. Some of the wastes from these operations are generated in small quantities [<5 gallons per year (gal/yr)] but are included in this section to provide a comprehensive review of the types of wastes found at NBAFS.

NBAFS operations include industrial and laboratory operations and activities in which limited amounts of pesticides; polychlorinated biphenyls (PCB); petroleum, oils, and lubricants (POL) including organic outside contractor. Rinseate was used in the formulation of all pesticides.

4.1.4 PCB HANDLING, STORAGE, AND DISPOSAL

Electrical power to NBAFS has been supplied by Public Service Company of New Hampshire since 1960. The power is initially received by the main substation, where voltage is reduced and routed to one of eight additional substations. Maintenance and repair of these substations, including dielectric fluid filtering, have always been the responsibility of outside contractors (NBAFS, 1977 and 1983b; Electric Power Testing Services, Inc., 1984). The Electrical Shop is responsible for inspection of grounds at substations. Supply records (American Electric Corp., 1981) indicate that in 1981, two transformers containing PCB were removed from service and transferred to DPDO at Ft. Devens. The transformers were transported by American Electric Corp. of Jacksonville, Fla. Since 1981, no transformers have been removed from service.

Three capacitors containing PCB have been identified on NBAFS at the main substation. These capacitors were manufactured by Westinghouse and contain Inerteen®, a PCB dielectric fluid. The pole-mounted capacitors were not labeled to show PCB warning labels. No other PCB or PCB-contaminated transformers have been identified at the installation.

Transformers are tested periodically (NBAFS, 1970; 1977b; 1977c; Electronic Power Testing, Inc., 1984) for the quality of dielectric fluid and inspected for leakage. No results of PCB tests are on file; however, it has been reported that none of the transformers at NBAFS contain PCB, because PCB tests are routinely performed by service contractors to ensure safety of personnel performing dielectric and physical tests of fluid. Reportedly, no significant PCB contamination of dielectric fluid exists at NBAFS.

There is no record of any PCB spills or disposal of PCB items occurring at NBAFS. No evidence of dielectric fluid residues was observed at any of the substations at NBAFS.

4.1.5 POL HANDLING, STORAGE, AND DISPOSAL

The types of POL used and stored at NBAFS include motor gasoline (MOGAS), diesel fuel, fuel oil, hydraulic fluid, and lube oils. Total POL storage at NBAFS is approximately 86,000 gal (NBAFS, 1981). The existing POL storage facilities are listed in Table 4.1-4.

POL spill management and waste disposal are addressed in the Oil Spill Contingency Plan for 6594th Instrumentation Squadron and Management of Contaminated/Used Liquid Petroleum Products (NBAFS, 1977d; 1980). These plans are reviewed regularly to ensure that they accurately reflect storage capacities and spill prevention/containment.

One aboveground tank is used to store diesel fuel for an emergency generator (Bldg. 125) (Dept. of the Air Force, 1980b; NBAFS, 1981). The tank has a 500-gal capacity and is diked for spill containment. Other aboveground POL storage includes drums and smaller containers which are used to store stock and waste materials. Drum storage areas were observed at the Motor Pool and Mechanical Shop storage areas (Bldg. 124), both of which are diked, and at the antenna facilities.

Twenty-two underground fuel storage tanks are located at the installation (NBAFS, 1981). Of these, 17 are fuel oil tanks, 2 are used for diesel fuel, 2 for MOGAS, and 1 for waste oil. The largest underground tank (20,000-gal capacity) was reportedly cleaned and inspected in 1979. There is no record of any leakage from POL tanks. None of the underground storage tanks have been tested for leakage. No abandoned POL tanks were identified at NBAFS.

Waste POL Storage, Handling, and Disposal

Waste POL at NBAFS includes lube oil, petroleum-based solvents, and hydraulic fluids. The generation and disposal of waste POL is summarized in Tables 4.1-1 and 4.1-2 (Sec. 4.1.1).

Table 4.1-4. Existing POL Storage Facilities

POL Type	Capacity (gal)	Bldg. No.	Protective Measures
No. 5 Fuel Oil	20,000	100	Underground
No. 2 Fuel Oil	5,000	118	Underground
No. 2 Fuel Oil	5,000	105	Underground
No. 2 Fuel Oil	4,000	105	Underground
No. 2 Fuel Oil	2,000	105	Underground
No. 2 Fuel Oil	10,000	141	Underground
MOGAS	4,000	141	Underground
MOGAS	4,000	141	Underground
Waste Oil	1,000	141	Underground
No. 2 Fuel Oil	4,000	109	Underground
No. 2 Fuel Oil	2,500	120	Underground
No. 2 Fuel Oil	1,000	114	Underground
No. 2 Fuel Oil	1,000	114	Underground
No. 2 Fuel Oil	1,000	103	Underground
No. 2 Fuel Oil	1,000	106	Underground
No. 2 Fuel Oil	1,000	108	Underground
No. 2 Fuel Oil	1,000	115	Underground
No. 2 Fuel Oil	500	101	Underground
No. 2 Fuel Oil	6,000	117	Underground
No. 2 Diesel	4,000	117	Underground
No. 2 Fuel Oil	6,800	142	Underground
No. 2 Diesel	300	125	Underground
No. 2 Diesel	500	125	Aboveground Diked System

Sources: ESE, 1985.
NBAFS, 1981.
NBAFS, 1977d.

From 1960 to 1974, the only significant generation of waste POL was from gearbox changes at the antenna facilities and refrigerant oil changes by the Mechanical Shop. It is reported that all waste lube oil from the antenna was transported to Grenier AFB for use in firefighter training exercises. Since the construction of the Motor Pool in 1974, all waste POL have been placed in the designated drums or underground tank at Bldg. 141. These wastes are stored near the Motor Pool (Bldg. 141) until maximum storage capacity is reached, at which point an outside contractor removes the wastes offsite for recycling.

During the onsite inspection, 37 drums containing waste POL, ethylene glycol, and paint slops were observed adjacent to Bldg. 141 on an unbermed area. This storage area is discussed further in Sec. 4.2.

Until 1982, hydraulic fluids and petroleum-based solvents were comingled with lube oils in the underground tank. Currently, hydraulic fluids, sludge from the parts washer (at Motor Pool), and lube oils are segregated and disposed of separately.

Firefighter training exercises are conducted 12 times each year near the softball field adjacent to Deer Pond. The flammable materials used in the training exercises are contained in a 55-gal drum. No POL are spilled on the ground for ignition. No potential exists for contaminant migration. Gasoline is used to ignite fires. AFFF and Halon 15/17 (variable quantities) are the suppressants used in these exercises, which have been performed at NBAFS since 1974. Prior to 1974, all firefighter training was conducted at Grenier AFB.

4.1.6 RADIOACTIVE MATERIALS HANDLING, STORAGE, AND DISPOSAL

Only very limited types and quantities of radioactive materials have been used at NBAFS. These are phosphor-coated cathode ray tubes used in the QC Laboratory and PMEL instrumentation and smoke detectors containing tritium installed in most buildings at the station and stored in the Electrical Shop (Bldg. 117).

Cathode ray tubes are being phased out of the instrumentation at NBAFS and replaced with more modern, solid-state components. As shown in Table 4.1-2, the maximum rate of disposal has been approximately three per year. Currently, nearly all former tubed instrumentation has been replaced. Cathode ray tubes are low-level radiation sources and were disposed of from 1960 to 1968 in the onsite sanitary landfill and into the general solid waste, which was contract hauled from 1968 to 1980, in accordance with accepted practice for those time periods. Since 1980, these tubes have been turned in to DPDO for disposal through Ft. Devens. It is estimated that 20 to 30 tubes (3/year x 8 years = 24) were disposed of in the onsite sanitary landfill and that 30 to 40 tubes were disposed of into the trash and hauled offbase from 1968 to 1980.

Tritium smoke detectors of the type commercially available for household use have been used since the mid-1970s. These items have salvage value and have, therefore, always been disposed of through DPDO.

4.1.7 EXPLOSIVE/REACTIVE MATERIALS HANDLING, STORAGE, AND DISPOSAL

Aerial/Bombing Strafing Ranges

From 1942 to 1958, the land occupied by NBAFS was used as a bombing range and controlled by the 14th Air Force at Grenier AFB. It is estimated that up to 2,200 acres of the station may be contaminated with live ordnance (NBAFS, 1983a). During that period, practice bombs and high-explosives bombs reportedly up to 4,000 lb were used on targets, primarily centered on Joe English Pond. Targets were mounted on pilings set in the pond, which has a maximum depth of approximately 26 ft and a surface area of 30 acres (FWS, 1980). The bowl-shaped physiography of NBAFS was considered ideal for such a target area because the size of the impact area and risk to offbase populace of off-target bombs would be minimized by the surrounding hills. An additional target area, known as the shooting field, was located in an open meadow near Gardner Pond. Unserviceable tanks, trucks, and half-tracks were used as targets for strafing using machineguns, 20-millimeter (mm) cannons, and rockets. The locations of both these target areas are shown on Fig. 4.1-1. As a

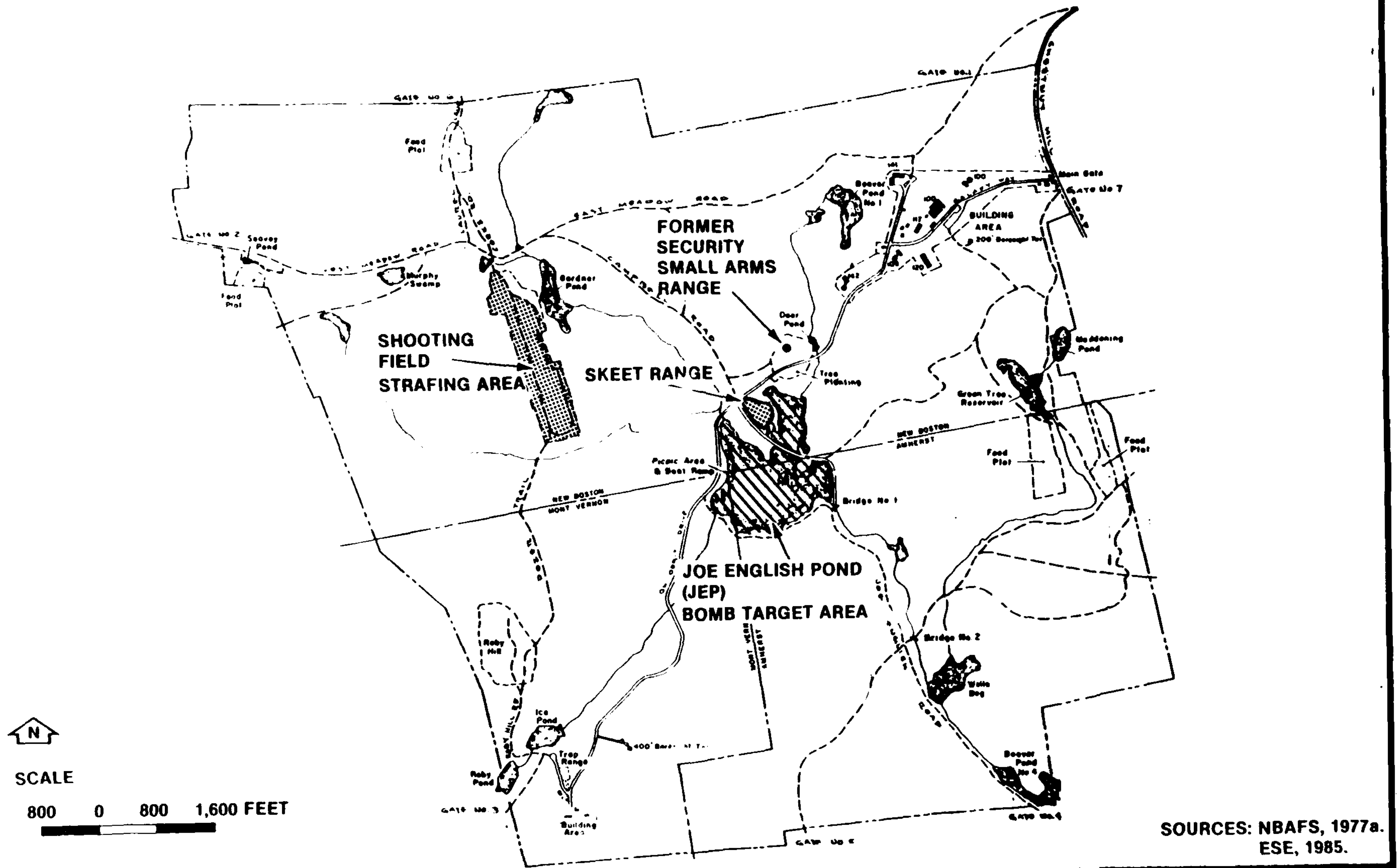

Figure 4.1-1
LOCATIONS OF FORMER BOMBING AND
STRAFING TARGET AREAS

INSTALLATION
RESTORATION PROGRAM
NEW BOSTON AIR FORCE STATION

result of the long period of use and the geographically separated, large target areas, stray ordnance has impacted most of the installation. When the site was selected for use as a tracking station, the operational areas and access roads were decontaminated (NBAFS, 1983a). The land management plan has focused on ensuring the safety of station personnel and those using the facilities. The plan was reviewed by HQ AFSC and Eglin AFB EOD in 1981 (NBAFS, 1983a).

UXO has been discovered frequently throughout all sections of the installation. A listing of ordnance found between 1973 and 1984 is presented in Table 4.1-5. Reportedly, divers have indicated that the bottom of Joe English Pond is full of metal scrap and probable UXO. Disposal and handling of live ordnance is accomplished through the 14th EOD from Ft. Devens, MA. Ordnance found at NBAFS is either transported by EOD/Ft. Devens to an approved EOD burn range or detonated in place if deemed unsafe for removal and transport.

At a few locations near former target areas, trees contain significant amounts of embedded shrapnel. Although this is not a problem in overall harvesting of timber resources, trees adjacent to such areas have limited value for lumber because of the presence of shrapnel. Three successful timber sales by the Government have occurred at NBAFS. In a fourth instance, improper resale of timber taken from NBAFS for sawn lumber resulted in problems for the second buyer because of the shrapnel content. This resale was not a problem for the Government because of restrictions in the primary harvesting contract.

The presence of UXO presents a very real hazard to open, uncontrolled use of the station. Although prime target areas used during its life as a range have been identified, munitions (live and inert) have been found in virtually every major area of the station. This must be seriously considered in any determination of disposal of the property. In addition, the requirement for increased use of the station by local military units for tactical training must be considered. NBAFS is the

Table 4.1-5. Live Ordnance (Explosive/Reactive Material) Found on NBAFS, 1973 through 1984

Date	Type Ordnance (Live)
Summer 1973	150-lb bomb
Oct. 31, 1974	100-lb bomb
Nov. 2, 1974	Two 250-lb bombs
July 10, 1976	Rocket
May 23, 1977	Several 20-mm shells
July 26, 1977	4-lb practice bomb
July 29, 1977	Unspecified
Sep. 4, 1977	20-mm and 50-caliber shells
April 24, 1978	Bomb, unspecified size
May 5, 1979	Unspecified
July 5, 1979	Grenade-type device
July 14, 1979	Two 250-lb bombs
July 22, 1979	150-lb bomb
Sep. 23, 1979	Unspecified
Oct. 25, 1979	Two 150-lb bombs
June 1, 1980	Two rockets
Oct. 20, 1980	Two rockets
Nov. 5, 1980	150-lb bomb
May 18, 1981	750-lb bomb
May 18, 1981	1,000-lb bomb
May 18, 1981	500-lb bomb
May 18, 1981	250-lb bomb
Aug. 10, 1981	Rocket
Aug. 30, 1981	Rocket
June 15, 1982	Three rockets
July 20, 1982	Two rockets
July 20, 1982	20-lb bomb
Aug. 18, 1982	Artillery round
Aug. 27, 1982	100-lb bomb
Oct. 27, 1982	100-lb bomb
1983	None reported
1984	None reported

Sources: NBAFS, 1983c.
ESE, 1985.

only Federal reservation suitably close, accessible, and available to the 368th Engineering Battalion (Army Reserve) and 642nd Engineering Company (U.S. Army) which affords construction training in a tactical environment, thereby totally fulfilling their training mission requirements (NBAFS, 1983a). Further, the unique topographical feature of Joe English Hill provides the only rock-climbing capability suitably close for Special Forces from Ft. Devens. This feature is in high demand by the Special Forces for mountain training.

In addition to the military use, NBAFS has plans for expanding recreational use of the land for hiking, camping, and fishing. Increased use pressure markedly increases the risk of contact with UXO, which continually works its way to the surface as a result of freezing and thawing of the soils.

Currently, no range guards or barriers (U.S. Army, 1978) are posted for NBAFS.

In addition to the use of NBAFS as a bombing/strafing range, two other operations involving small-arms munitions have been conducted at the station: a small-arms target range for station security and a recreation skeet range.

Pistol Range

A pistol range operated by the USAF Police from 1960 to 1972 was equipped with a berm to catch lead slugs expended in training. The range was located adjacent to Deer Pond at the site of the softball field. The slugs were reportedly salvaged from the berm on a routine basis. The berm was demolished after the facility closed.

Skeet Range

Currently, a trap range located near Joe English Pond is the only small-arms practice site at NBAFS. The skeet range is located at the northeastern corner of Joe English Pond, as shown in Fig. 4.1-1. Skeet targets are fired at as they fly toward a wetland area north and east of Joe English Pond. The use of lead shot directed over a wetland area which is a waterfowl habitat has been addressed in the NBAFS Forest/Fish and Wildlife Plan (U.S. Fish and Wildlife Service, 1980).

Joe English Pond

The main target area for bombing practice was immediately adjacent to Joe English Pond, as seen from aerial photographs taken during the 1940s. Therefore, this ponded area is considered the primary zone of concentration for UXO within the pond sediments and subsurface soils. This site has potential for contamination and migration of contaminants and, therefore, was ranked using the HARM process (see App. H).

Conclusions and recommendations regarding this site are presented in Secs. 5.0 and 6.0.

4.2 WASTE DISPOSAL METHODS AND DISPOSAL SITE IDENTIFICATION, EVALUATION, AND HAZARD ASSESSMENT

As described in the current and past activity review (Sec. 4.1), various methods have been used for disposal of wastes generated by NBAFS operations. Because of the small size and consistent mission of the industrial and laboratory operations at NBAFS, only small quantities of wastes are generated. And, because of the wastes generated, the State of New Hampshire has recommended to EPA Region I that NBAFS be removed from the hazardous waste generator list. Onsite disposal of solid waste was by landfilling at a single site (Landfill-1) prior to 1968; since that time solid wastes have been transported offsite to municipal landfills or contract disposed through DPDO (Ft. Devens) for reclamation. A single fuel spill of 75 to 100 gal was reported. This spill was controlled and did not result in environmental contamination. Because of the mission of NBAFS transfer bulk loading, large quantities of POL do not occur on a frequent basis. Two construction rubble fills also exist at NBAFS. Liquid industrial wastes were disposed as follows. Ethylene glycol was discharged to the ground adjacent to Bldg. 106 from 1964 to 1974 and adjacent to Bldg. 141 from 1978 to the present. Boiler blowdown and deionizer resin regenerating salt solution from Bldg. 100 are discharged to the storm sewer. Waste oil from the Motor Pool (Bldg. 141), is hauled offsite and reclaimed by a contractor. Prior to 1974, no motor pool existed at NBAFS.

Salt (sodium and calcium chloride) used to control ice and snow on the roads, walkways, and parking lots, runs off via the storm drainage system and discharges to the Beaver Pond drainage. Overland flow of a portion of the drainage passes over the areas of Wells No. 1 and 2. Significant amounts of the salt-contaminated runoff probably infiltrates at the edges of the built-up area because of the coarse nature of the soils.

Because of the nature and long duration of the use of the site as a bombing range (1942 to 1958) prior to the establishment of NBAFS, approximately 2,200 acres of the total area of NBAFS is considered to potentially contain UXO. The main bombing target was Joe English Pond. The bottom of this pond is littered with bomb casings and shrapnel. The hill adjacent to Joe English Pond also is littered with shrapnel. The Shooting Field, a strafing range, also is littered with shrapnel. Weapons used on the Shooting Field were primarily machineguns, 20-mm cannon, and rockets.

Each of these sites or areas was evaluated in Sec. 4.2 as to the potential for contamination and contaminant migration. A drum storage site, the former landfill, and the Joe English Pond target area were identified as having the potential for contamination by toxic or hazardous materials. Other sites/operations were referred to the station environmental programs. In Sec. 4.2, these sites are referred to by site designation (e.g., CS-1, SD-1, etc.) descriptive of the site type.

4.2.1 STORMWATER DRAINAGE SYSTEM

Two stormwater drainage system disposal sites were identified on the station. Information for these sites is summarized in Table 4.2-1; Fig. 4.2-1 shows the location of these sites.

Stormwater Drainage Disposal Site No. 1 (SD-1)

Wastewater from boiler blowdown and water conditioning resin regeneration has been discharged to the stormwater drainage system (Bldg. 100) since 1960. This site is designated as SD-1. These wastes are combined with cooling water, and the discharge is permitted under an NPDES permit. Because of dilution and flushing in the storm drain system, there is little potential for residual contamination from this discharge.

Stormwater Drainage Disposal Site No. 2 (SD-2)

Since 1974, waste battery acid (20 gal/yr) has been neutralized with sodium bicarbonate and disposed of in the stormwater drainage system at the Logistics Branch Motor Pool (Bldg. 141). Battery acid electrolyte

Table 4.2-1. Summary of Information on NBAFS Stormwater Drainage Disposal Sites

Site Description	Designation	Dates of Operation	Waste Description
Bldg. 100, Boiler Shop	SD-1	1960-present	Boiler blowdown containing non-toxic corrosion-inhibiting compounds, antifoam agents, pH adjustment compounds, and resin regeneration salt
Bldg. 141, Logistics Branch Motor Pool	SD-2	1974-present	Waste battery acid neutralized with sodium bicarbonate

Source: ESE, 1985.

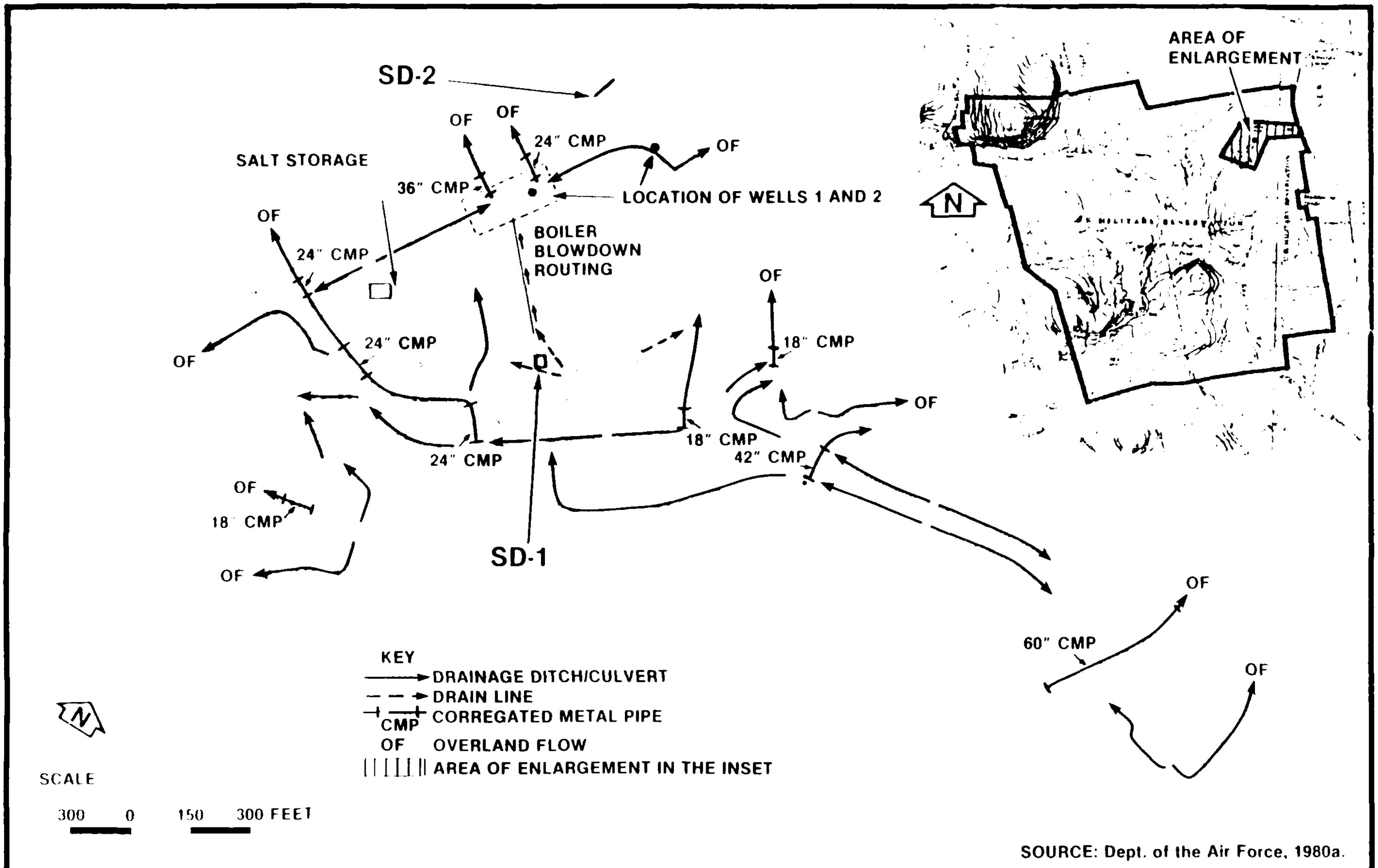

Figure 4.2-1
STORMWATER DRAINAGE DISPOSAL SITES ON
AREAS A AND B OF NBAFS

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AD-A157 633 INSTALLATION RESTORATION PROGRAM PHASE I RECORDS SEARCH 2/4
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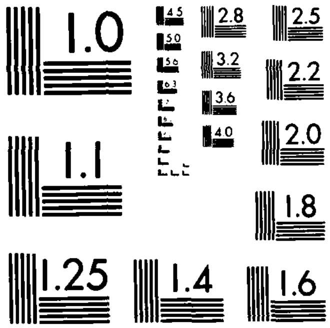

MICROCOPY RESOLUTION TEST CHART
DARDS-1963-A

consists of sulfuric acid, and the neutralization process produces carbon dioxide gas and sodium sulfate salt, which are neither toxic nor hazardous.

Due to its use in lead cell batteries, however, spent electrolyte also contains high levels of dissolved lead and possibly cadmium. Upon contact with the neutralizing material, these metals would form very insoluble carbonates and remain in the residue from the neutralization process. Because of the very small volume of waste electrolyte disposed of and dilution and flushing in the storm sewer, little residual contamination in the storm sewer is expected. Because this is an ongoing operation involving disposal of residue-containing toxic metals and the fact that alternative disposal methods are available (e.g., containerizing and turning in to DPDO), it was determined that this operation warranted review and modification under the base environmental program.

The stormwater drainage system at NBAFS shown in Fig. 4.2-1 is designed to carry runoff from the roads, walkways, roofs, and parking lots of Areas A and B. In general, the drainage flows overland from the area shown in Fig. 4.2-1 to the Beaver Pond system. As is common practice in New England, salt (sodium and potassium chloride) is used during winter to control ice and snow. This material runs off via the storm drainage system with melt water. The limited surface water quality data indicated that the conductivity of Deer Pond downstream of the major stormwater impact (Fig. 4.2-2) was 100 umhos/cm at 25°C. The conductivity in other surface systems at NBAFS ranges from 20 to 30 umhos/cm at 25°C. Runoff also probably infiltrates to a large extent as a result of the permeability of the thin (6- to 8-ft thick) layer of coarse-grained soil overlying the fractured bedrock. In addition, a significant portion of the runoff is directed immediately over the locations of Wells No. 1 and 2, which supply the majority of NBAFS potable water. Infiltrated stormwater or direct downhole contamination by runoff may be impacting water quality in Wells No. 1 and 2. As

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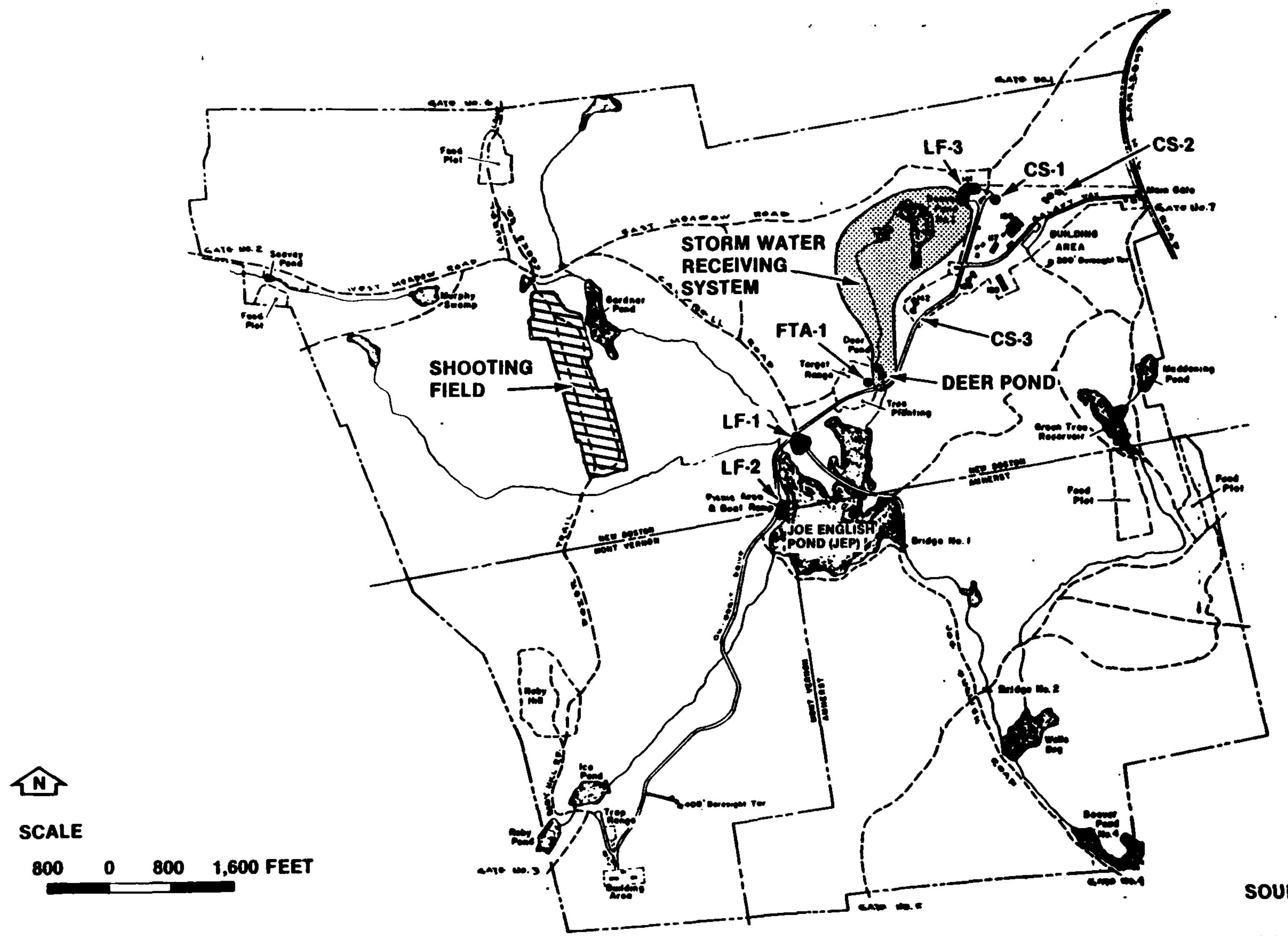

SOURCES: NBAFS, 1977a.
ESE, 1985.

Figure 4.2-2
LOCATIONS OF LANDFILLS, CHEMICAL SPILL/DISPOSAL AREAS, TARGET AREAS, FIREFIGHTER TRAINING AREA

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described in Sec. 3.4.2, chloride levels have increased markedly since the mid-1960s and now are approaching the NSDWR recommended limit of 250 mg/l. NSDWR limits are based on aesthetic or treatability considerations rather than protection of human health from adverse effects. As also described in Sec. 3.4.2, sodium levels range from 48 to 103 mg/l in Wells No. 1 and 2 as compared to 8 to 13.5 mg/l for Well No. 3, which is remote from the influence of road salt. No New Hampshire or Federal standards exist for sodium in water; however, NRC/NAS (1977) has recommended a limit of 20 mg/l in drinking water for persons on sodium-restricted diets. NBAFS has posted warnings at water fountains for persons with sodium restrictions, has sent a memo to all station personnel, and periodically monitors sodium concentrations.

In addition to storm/melt water infiltrate runoff and subsequent infiltration from the salt storage area, boiler blowdown water (see Fig. 4.2-1) may migrate toward Wells No. 1 and 2. The blowdown water is permitted under NPDES and contains high salt content (see App. F); however, the volume of blowdown water compared to runoff and infiltrate is insignificant. The magnitude of effect from runoff from the salt storage compared to street and parking lot runoff is unknown.

Although the runoff and possibly the salt storage are affecting water quality, no human health standards are currently threatened and salt is not a contaminant considered toxic and hazardous under the IRP described in Sec. 1.0. The ongoing storage practices, stormwater routing, and checking of the integrity of the casing of Wells No. 1 and 2 have been referred to the Station Environmental Programs.

4.2.2 LANDFILLS

One sanitary landfill has been operated on NBAFS since the installation was acquired by USAF. Two debris and rubble fills were identified on the installation. The landfill locations are identified in Fig. 4.2-2.

Landfill No. 1 (LF-1) is located in the central section of the installation, adjacent to Joe English Pond. The landfill is approximately 0.75 acre in size and was used for disposal between 1960 and 1968. Fill material consisted of station sanitary trash, scrap wire, recording tapes from tracking operations, and minor amounts of construction debris. Empty 5-gal cans were reportedly disposed of at the site; however, available information indicates no waste POL or liquid wastes were disposed of in the landfill. The operation consisted of removing 3 to 4 ft of alluvium to bedrock and infilling the trench/pit with debris. A small, classified-documents incinerator was operated adjacent to the fill area. Small amounts of ash generated may have been disposed of at LF-1. The landfill is completely closed and exhibits a good soil cover. This site has potential for contamination based on the wastes generated at NBAFS and migration of contaminants in the permeable substrate and high potentiometric surface and, therefore, was ranked using the HARM process (see App. H). Conclusions and recommendations regarding this site are presented in Secs. 5.0 and 6.0, respectively.

Two debris landfills were identified on NBAFS (Fig. 4.2-2). Disposal of construction debris and rock rubble occurred on the west side of Joe English Pond. The site (LF-2) was filled in the early 1960s and is soil covered and revegetated. The second area (LF-3) is beneath the Motor Pool (Bldg. 141) and was used for disposal of rock rubble and small amounts of construction debris during the early 1960s. LF-2 and LF-3 have no potential for contamination or leachate formation. Based on the decision process outlined in Fig. 1.3-1, these sites were deleted from further consideration.

4.2.3 CHEMICAL SPILL/DISPOSAL SITES

One chemical spill and two chemical disposal sites were identified on NBAFS. Information regarding these sites is summarized in Table 4.2-2. The locations of these sites are shown in Fig. 4.2-2.

One drum storage area, located at the end of On-Orbit Drive adjacent to Bldg. 141, was identified on NBAFS (Fig. 4.2-2). The area (designated

Table 4.2-2. Summary of Information on NBAFS Chemical Spill/Disposal Sites

Site Description	Designation	Dates of Operation	Waste Description
Bldg. 141, Drum Storage Area Spill Site	CS-1	1974-present	Waste POL products, solvents, ethylene glycol
FACC Antenna Facility Disposal Site	CS-2	1960-1974	Ethylene glycol
SATCOM Facility Disposal Site	CS-3	1978-present	Ethylene glycol

Source: ESE, 1985.

CS-1) has been used since 1974 for the storage of waste POL and other materials awaiting removal. A total of 37 drums were present at the time of the site visit. Of these, approximately 10 drums were "blown" or bulged in appearance. Labels on the drums indicated that waste oil is stored in ten drums, lube oil in five, fuel oil/water in one, paint slops in five, parts-cleaning solvent in three, and ethylene glycol in five. Eight drums had no labels or were empty. The number of drums with contents which correspond to the respective labels is not known. In addition to the drums, six lead acid batteries were observed at the site. Because of the condition of the drums there is a high probability of spillage at this site. Subsequent to the site visit, the drums and batteries have been moved to a secure area which is bermed, covered, and fenced.

Drainage from CS-1 flows to the northeast into a wetland area, which ultimately drains to Campbell's Swamp. A thin veneer of coarse soil overlies fractured bedrock at the site. The soil exhibits moderately high permeability. CS-1 has potential for contamination and migration of contaminants and, therefore, was ranked using the HARM process (see App. H). Conclusions and recommendations regarding this site are presented in Secs. 5.0 and 6.0.

Ethylene glycol has been disposed on the ground adjacent to the 60-ft antenna operated by FACC (Bldg. 106) and at the SATCOM facility operated by Det. 1 2014th Communication Squadron (Bldg. 142). These sites are located as CS-2 and CS-3, respectively, on Fig. 4.2-2. Each disposal was in the form of a single discharge yearly at the time fluid was exchanged at each site. At CS-2 100 gal/yr were disposed for the period 1960 to 1974 (14 years). Since that time, waste ethylene glycol from CS-2 has been contract hauled offbase for disposal. At CS-3, disposal on the ground was still standard operating procedure. At CS-3, 45 gal/yr have been disposed since 1978 (7 years). Ethylene glycol is biodegradable. The quantities discharged and method of disposal would have allowed the soil microflora to degrade the ethylene glycol.

Because of this, no significant residual contamination is suspected. Because of this factor, Sites CS-2 and CS-3 were deleted from further consideration based on the decision process outlined in Fig. 1.3-1. Disposal of ethylene glycol generally is covered by regulations governing POL; therefore, the disposal at CS-3 has been referred to the Station Environmental Programs.

4.2.4 FUEL SPILL SITE

No major fuel spills (greater than 100 gal) have been reported at NBAFS. Due to the mission of the installation, transfer and bulk loading of large quantities of fuel do not occur on a frequent basis. However, interviews with station personnel indicate one minor fuel spill incident. Reportedly, approximately 75 to 100 gal of diesel fuel were spilled in 1976 when a pump malfunctioned. The spill occurred at the Motor Pool (Bldg. 141) (designated FS-1). The fuel was contained on the asphaltic pavement prior to cleanup, and no residual contamination or contamination of the subsurface occurred. Records searched did not indicate any additional reportable spills at NBAFS. Based on the decision process outlined in Fig. 1.3-1, this site was deleted from further consideration.

4.2.5 FIREFIGHTER TRAINING AREA

Firefighter training at NBAFS is conducted at the softball field adjacent to Deer Pond (Fig. 4.2-1). This training area is designated FTA-1. The training exercises are extremely small. The operation consists of ignition of small amounts of POL in half of a 55-gal drum. The fuel used in those exercises is contained within the 55-gal drum. This practice has been used approximately 12 times per year since 1974. FTA-1 poses no potential for contamination or hazardous leachate formation. Therefore, based on the decision process outlined in Fig. 1.3-1, this site was deleted from further consideration.

Prior to 1974 all firefighter training was conducted at Grenier AFB.

4.2.6 FORMER BOMBING AND STRAFING TARGET AREAS

During World War II, the Korean Conflict, and for a period after the Korean Conflict, the 14th Air Force used the site of NBAFS as a bombing and strafing target range. This practice occurred from 1942 to 1958 and is described in Sec. 4.1.7. Both live high-explosive bombs and practice bombs were used as well as machinegun, 20-mm cannon, and rockets; no records for the use of any chemical weapons exist. Two major target areas were identified and are shown in Fig. 4.2-2: the Joe English Pond Bomb Target Area (JEP) and the shooting field which was used for strafing attacks. These areas were heavily used and are littered with shrapnel. Divers have reported that the bottom of JEP is covered by shrapnel and bomb cases. The shooting field also contained the wreckage of trucks, tanks, and half-track vehicles used as strafing targets. Most of the wreckage has been removed. As described in Sec. 4.1.7, UXO may be found nearly anywhere on NBAFS.

The soils at NBAFS form a thin layer (3- to 10-ft thick) over bedrock except possibly in wetland areas where peat deposits may be thicker. As a consequence, ordnance is unable to penetrate to any great extent. Subsequent freezing and thawing of the soils continually bring up shrapnel, spent bullets, and bomb parts as well as potential UXO (presenting a safety hazard to those using the undeveloped areas of NBAFS for training or recreation). In addition to the potential for encountering UXO, bombs, rocket warheads, and 20-mm cannon projectiles contain explosive formulations of 2,4,6-trinitrotoluene (TNT); hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX); octahydro-2,4,6,8-tetranitro-2,4,6,8-tetrazine (HMX); and tetryl (trinitrophenylmethylnitramine). TNT and RDX are toxic materials if released in the environment and have had water quality criteria set by the Surgeon General for protection of human health (USAMBRDL, 1980). No regulatory criteria exist for HMX and tetryl. TNT transforms to some extent in the environment to 2,4- and 2,6-dinitrotoluene (DNT) and to 1,3,5-trinitrobenzene (TNB). The compounds 2,4-DNT and 2,6-DNT are suspected carcinogens. EPA (1980) has promulgated water quality criteria for 2,4-DNT. No regulatory criteria exist for TNB. The criteria for TNT, RDX, and 2,4-DNT follow.

Compound	Regulatory Criterion/Basis
TNT	44.3-microgram/l toxicity
RDX	33.7-microgram/l toxicity
2,4-DNT	1.1-microgram/l 10^{-5} cancer risk
	0.1-microgram/l 10^{-6} cancer risk

On the shooting field and the areas not specified as target areas, UXO hazard exists. The environmental release of explosives would occur as residues from explosion or corrosion of UXO. In general, residues from explosions would be very diffused and of such small quantities that no residual contamination would be expected to occur. Any release from corroded UXO would be localized to the immediate vicinity of the individual UXO. Such contamination would be located so widely spaced over 2,200 acres that significant contamination migration would not be detectable in surface or ground waters. Because of these factors, the UXO explosive hazard has been referred to the station environmental programs and is considered in the recommended guidelines for land use restrictions; however, because of the diffuse and sporadic nature of any toxic residues and lack of potential for significant migration, the shooting field and remote areas of NBAFS were deleted from further consideration based on the process outlined in Fig. 1.3-1.

Joe English Pond contains a large concentration of casings, shrapnel, and potential UXO. In the slightly acidic waters and sediments, rapid corrosion may be expected. In contrast to artillery projectiles which have thick casings and require hundreds of years to corrode completely, some bomb casings are thin and may corrode to release explosives within 20 to 50 years. Because of these factors, potential contamination exists in Joe English Pond as a result of the quantities of toxic explosives residues and/or their transformation products potentially capable of being released. No analyses for explosives residues have been performed for Joe English Pond waters on sediments or for adjacent ground water. The overflow from Joe English Pond exits NBAFS to the southeast and discharges into the Amherst Conservancy District forming a component of the potable water supply for the Town of Amherst. The potentiometric surface of the ground water in the central portion of NBAFS appears to be above the land surface. Ground water flow direction is probably along the channel of Joe English Brook.

Potentially, ground water may receive contamination leaching from the sediments of the pond or receive contamination by inflow to the pond and subsequent outflow. Migration of contamination from Joe English Pond is therefore possible by both surface and ground water routes. Joe English Pond was therefore ranked using the HARM process (App. H). Conclusions and recommendations regarding this site are presented in Secs. 5.0 and 6.0.

4.2.7 HAZARD ASSESSMENT EVALUATION

The review of past operation and maintenance functions and past waste management practices at NBAFS has resulted in the identification of 12 sites that were initially considered areas of concern, with potential for contamination and migration of contaminants. These sites, described in Secs. 4.2.1 through 4.2.6, were evaluated using the decision process presented in Fig. 1.3-1 (in Sec. 1.3). Nine sites found to have no potential for contamination were deleted from further consideration. Three of these sites were found to warrant review of operational procedures and modification under the Station Environmental Programs. These sites are identified under the column "Refer to Base Environmental Programs" in Table 4.2-3. Specific recommendations are described in Sec. 6.0.

Three sites which were found to have potential for contamination and migration of contaminants by the decision process are described in Sec. 1.3. In addition, two of these sites (CS-1 and JEP) were also referred to the Station Environmental Programs for review of current operations. The decision process logic used for each area of initial

Table 4.2-3. Summary of Decision Process Logic for Areas of Initial Environmental Concern at NBAFS*

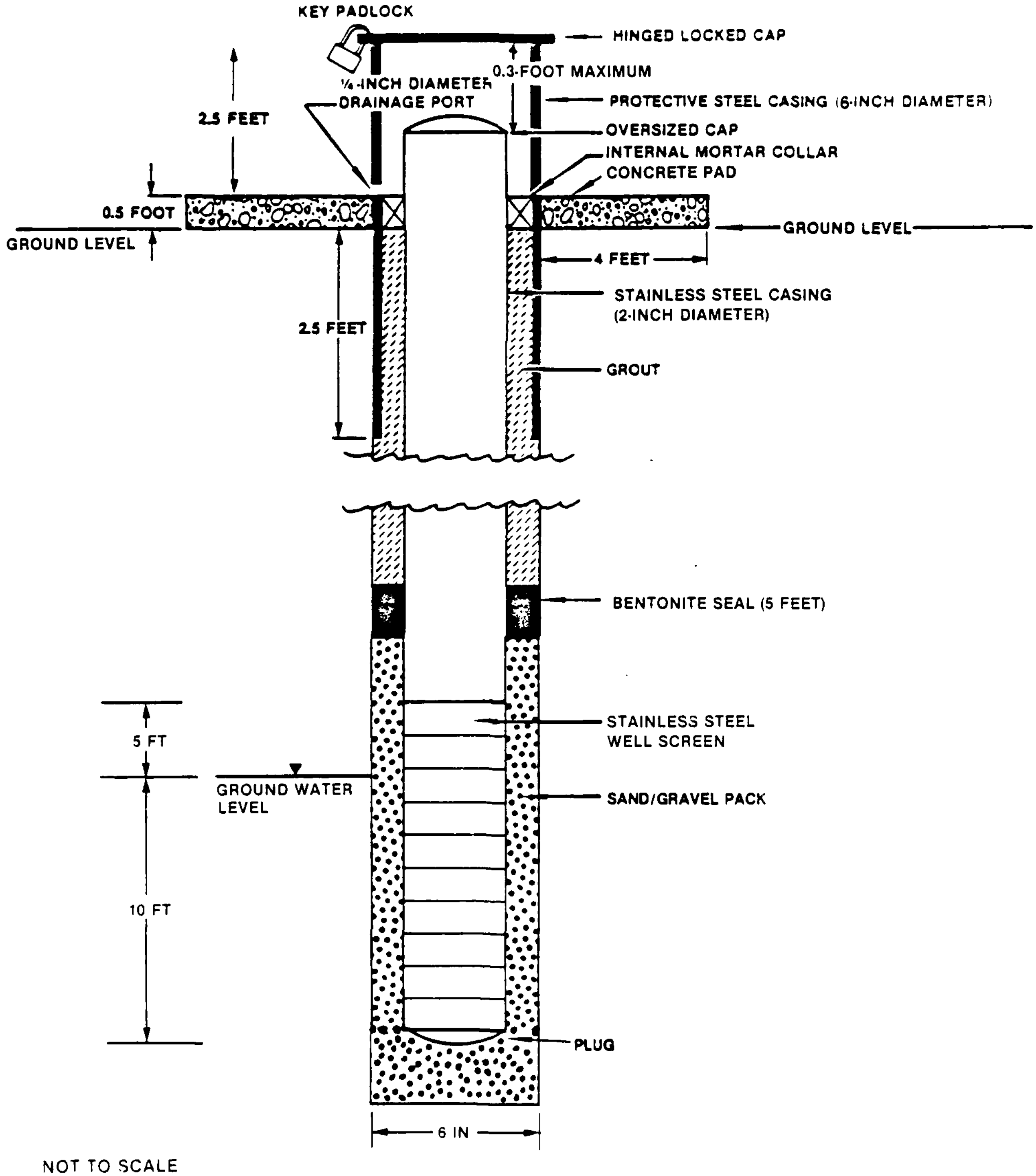
Site	Designation	Potential for Contamination	Potential for Contaminant Migration	Potential for Other Environmental Concern†	Refer to Base Environmental Programs for Future Action	HARM Rating
Landfill No. 1	LF-1	Yes	Yes	No	No	Yes
Landfill No. 2	LF-2	No	No	No	No	No
Landfill No. 3	LF-3	No	No	No	No	No
Stormwater Drainage System Disposal Site No. 1 (Boiler Blowdown)	SD-1	No	No	No	No	No
Stormwater Drainage System Disposal Site No. 2 (Battery Acid Waste)	SD-2	No	No	No	Yes	No
Firefighter Training Area	FTA-1	No	No	No	No	No
Chemical Spill/Disposal Site No.1	CS-1	Yes	Yes	No	Yes	Yes
Chemical Disposal Site No. 2	CS-2	No	No	No	No	No
Chemical Disposal Site No. 3	CS-3	No	No	No	Yes	No
Shooting Field and Undeveloped Non-Target Areas	N/A**	Yes	No	Yes	Yes	No
Joe English Pond Area	JEP	Yes	Yes	Yes	Yes	Yes
Fuel Spill Site	FS-1	No	No	No	No	No

*Refer to Fig. 1.3-1 for the decision process.
†Other environmental concerns include environmental problems that are not within the scope of this study (e.g., air pollution, occupational safety problems).
**N/A = Not applicable.

Source: ESE, 1985.

concern is presented in Table 4.2-3. These sites (LF-1, CS-1, and JEP) were found to have potential for contamination or contaminant migration and were evaluated using the HARM system. The HARM system includes consideration of potential receptor characteristics, waste characteristics, pathways for migration, and specific site characteristics related to waste management practices. The details of the rating procedure are presented in App. G; results of the assessment are summarized in Table 4.2-4.

The HARM system is designed to indicate the relative need for remedial action. The information presented in Table 4.2-4 is intended for assigning priorities for further evaluation of the NBAFS disposal areas (Sec. 5.0--Conclusions and Sec. 6.0--Recommendations). The rating forms for the individual waste disposal sites at NBAFS are presented in App. H. Photographs of each of the ranked disposal sites are included in App. J.



SOURCE: ESE, 1985.

Figure 6.1-2
RECOMMENDED MONITOR WELL
CONSTRUCTION DETAILS

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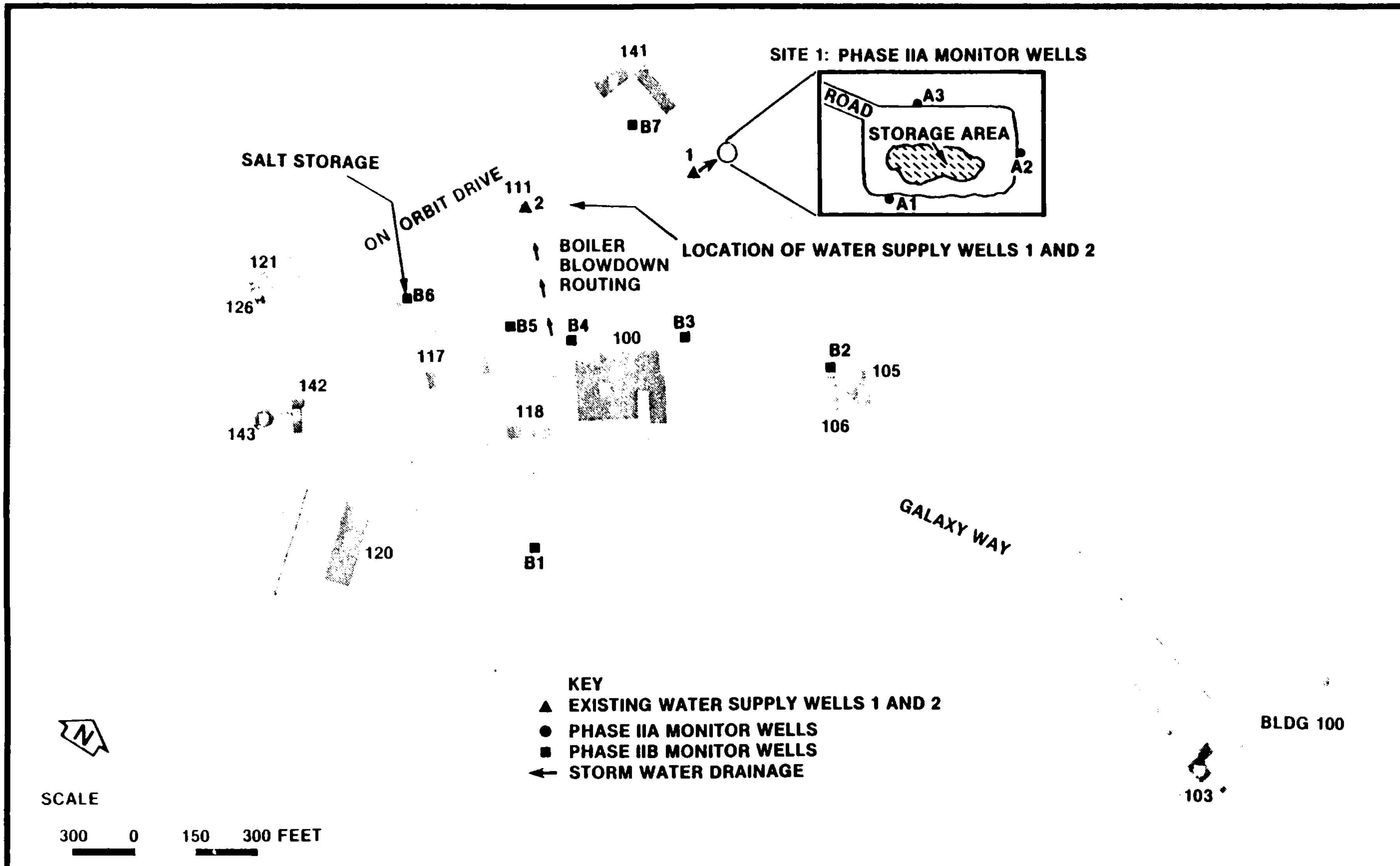
on the immediate disposal area Site 1, will be adequate to confirm that no significant spills had occurred which resulted in environmental contamination at Site 1. If ground water monitoring at Site 1 indicates contamination, further action including soil sampling to identify the exact spill source(s) may be required.

If the quarterly monitoring of Wells No. 1 and 2 indicates contamination, a second phase (Phase B) for further source identification will be required to determine whether the Bldg. 100, 141, 105/106, or 117 areas contribute to this contamination. An additional 7 wells would be required, as shown in Fig. 6.1-1, to provide for an upgradient background well and wells designed to intercept plumes from each potential source. If this phase is required, Wells No. 1 and 2, each of the 7 Phase B wells, and the downgradient Phase 1 well should be monitored quarterly for 1 year for the contaminant matrix observed in Wells No. 1 and 2. The need for further remedial action requirements should be evaluated based on the findings of the Phase II program.

The monitor wells should be constructed of 2-inch stainless-steel casing and screen. The wells should be installed such that approximately 10 ft of the screen extends into the saturated zone and approximately 5 ft extends above the water table. The wells need to be screened above the water table to detect any nonmiscible, floating petroleum product contaminant. The recommended details for well construction are presented in Fig. 6.1-2. A detailed log of the well borings should be made, including well construction diagrams prepared by a registered geologist. Shelby tube samples collected during drilling should be tested to determine vertical permeability. The annulus surrounding the screen should be filled with a filter pack material of medium-fine sand. The top of the filter pack should be bentonite-sealed, and the annulus should be grouted to the surface. The well should be protected with 14-inch pipe fitted with locking caps. The well should be developed to the fullest extent possible and surveyed both vertically and horizontally by a registered surveyor to obtain accurate well location



SOURCE: Dept. of the Air Force, 1980a.

Figure 6.1-1
LOCATION OF PHASE IIA AND B MONITOR WELLS
AT SITE NO. 1

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Table 6.1-2. Monitoring Requirements for Phase A at Chemical Spill/ Disposal Site No. 1

Wells	Parameter	Quarter 1	2	3	4
Existing Wells No. 1 and 2	Volatile organics by GC/MS, EPA Method 624*	X	X	X	X
	Extractable organics by GC/MS, EPA Method 625*	X			
	Arsenic by anhydride AA, EPA Method 206.3†	X			
	Metals Pb, Zn, Cd, Cu, Cr, by ICP, EPA Method 200.7†	X			
	Mercury by cold vapor-AA, EPA Method 245.1*	X			
Disposal Site Monitor Wells (3)	Total organic halogens (TOX)** EPA Method 9020**	X	X	X	X
	Petroleum hydrocarbons by IR; EPA Method 418.1†	X	X	X	X
	Total organic carbon EPA Method 415.1†	X	X	X	X
	Metals Pb, Zn, Cd, Cu, Cr, by ICP, EPA Method 200.7†	X	X	X	X
	Mercury by AA-Cold vapor, EPA Method 245.1†	X	X	X	X
	Arsenic by Anhydride AA, EPA Method 206.3†	X	X	X	X

KEY: AA = Atomic Absorption Spectroscopy.
GC/MS = Gas Chromatography/Mass Spectroscopy.
ICP = Inductively Coupled Argon Plasma.

Sources: *EPA, 1984. 49 Federal Register, No. 209, pp 141-174.
†EPA, 1979. Methods for Chemical Analysis of Water and Wastes, EPA-600/4-79-020.
**EPA, 1983. Test for Evaluating Solid Waste Management, Physical-Chemical Method SW-86, 2nd Edition.

Table 6.1-1. Summary of Recommended Monitoring for NBAFS Phase II Investigations

Site No.	Site	Report Designation	HARM Score	Recommended Monitoring	Remarks
1	Chemical/Spill Disposal Site	CS-1	62	Install 1 upgradient and 2 downgradient monitor wells and monitor quarterly for total organic halogens, petroleum hydrocarbons, total organic carbon, and metals as described in Table 6.1-2. Monitor Potable Wells No. 1 and 2 quarterly for volatile organics, and as needed for extractable organics and metals as described in Table 6.1-2.	Continue monitoring if sampling indicates contamination. If Water Supply Wells No. 1 and 2 are contaminated, add additional wells (7 total) to identify other potential source(s).
2 3	Joe English Pond and Landfill No. 1	JEP and LF-1	61 and 51	Sample surface water quarterly at JEP, analyze for explosives, metals, volatile organics, and extractable organics. Install 1 well upgradient of both JEP and LF-1, 2 wells between LF-1 and JEP at the edge of LF-1, install one well downgradient of JEP in the drainage course of Joe English Brook. Analyze LF-1 wells for total organic halogens, petroleum hydrocarbons, total organic carbon, and metals. Analyze the well downgradient of JEP for volatile organics, extractable organics, metals, and explosives. Sample and analyze Potable Well No. 3 (southwest of JEP) for volatile organics, extractable organics, metals, and explosives. Analyze the upgradient well for volatile organics, extractable organics, metals, and explosives. Analytical details are described in Table 6.1-3.	Continue monitoring if sampling indicates contamination. Additional surface water locations or wells may be necessary to assess the extent of contamination.

Source: ESE, 1985.

6.0 RECOMMENDATIONS

6.1 PHASE II MONITORING RECOMMENDATIONS

Three sites were identified at NBAFS as having potential for environmental contamination, and these sites have been evaluated using the HARM system. The relative potential of the sites for environmental contamination was assessed. Recommendations for Phase II study and monitoring are summarized in Table 6.1-1 and are described in the following paragraphs.

SITE NO. 1: CHEMICAL SPILL/DISPOSAL SITE

The required action at this site is first referred to the station environmental programs to remove all drums, batteries, and any other potentially hazardous materials, to dispose of these in acccordance with applicable state and Federal regulations, and to cease using the area for waste storage. Temporary storage of such materials should be in a roofed, bermed area with an impervious floor, secured with a fence. Subsequent to the site visit, the drums and batteries have been moved by Detachment 2 to a secure area which is bermed, covered, and fenced to await disposal through DPDO.

The scope of monitoring at this site is contingent upon an analysis of the water in Wells No. 1 and 2 because of the 1980 single finding of TCE in Well No. 2. A phased approach is recommended. Phase A consists of quarterly monitoring of existing Wells No. 1 and 2 for 1 year for the parameter list presented in Table 6.1-2, and installation of 1 upgradient and 2 downgradient wells at the edges of Site 1 with quarterly monitoring for 1 year for the parameter list in Table 6.1-2. Well locations are shown on Figure 6.1-1. As shown in Table 6.1-2, if the initial gas chromatography/mass spectroscopy (GC/MS) scan for extractables and metals analyses in Wells No. 1 and 2 are negative, those components will be dropped. If the quarterly monitoring for volatile hydrocarbons is negative, the action described below, focused

The outflow from Joe English Pond is via a water control structure to Joe English Brook. This provides a route for surface water migration of contaminants off NBAFS into the wetlands of the Amherst Conservation District. These wetlands provide a component of the potable water supply for the town of Amherst, N.H.

The potentiometric surface of the ground water appears to be at a higher elevation than Joe English Pond. Ground water probably moves southeast from the pond area along the route of Joe English Brook. During different periods of the year both inflow to the pond and outflow from the pond to the ground water appear possible. During periods of ground water inflow, such water could carry contaminants from the contaminated sediments into the pond waters. During periods of lower water tables, leachate generated by passage of pond waters through the contaminated sediments could cause ground water contamination.

Because of these factors, contaminant migration is possible by both surface water and ground water routes.

This site received a HARM score of 61.

5.3 SITE NO. 3: LANDFILL NO. 1 REPORT DESIGNATION (LF-1)

A single sanitary landfill was operated at NBAFS from 1960, when the installation was acquired for use as a tracking station, to 1968. Since that time the landfill has been closed and revegetated. This landfill is located near the center of the installation, adjacent to Joe English Pond. No records exist documenting the disposal of toxic material or significant quantities of waste POL in LF-1. However, based on the wastes generated at NBAFS and the possibility that halogenated solvents could have been used (as was common practice in the early 1960s), the potential exists for contamination at LF-1. Because of its location in permeable substrate immediately above bedrock and the possible high local water table, potential for contaminant migration exists.

This site received a HARM score of 51.

2, respectively. This site is approximately 2,000 ft from the station boundary. Surface runoff enters a wetland area.

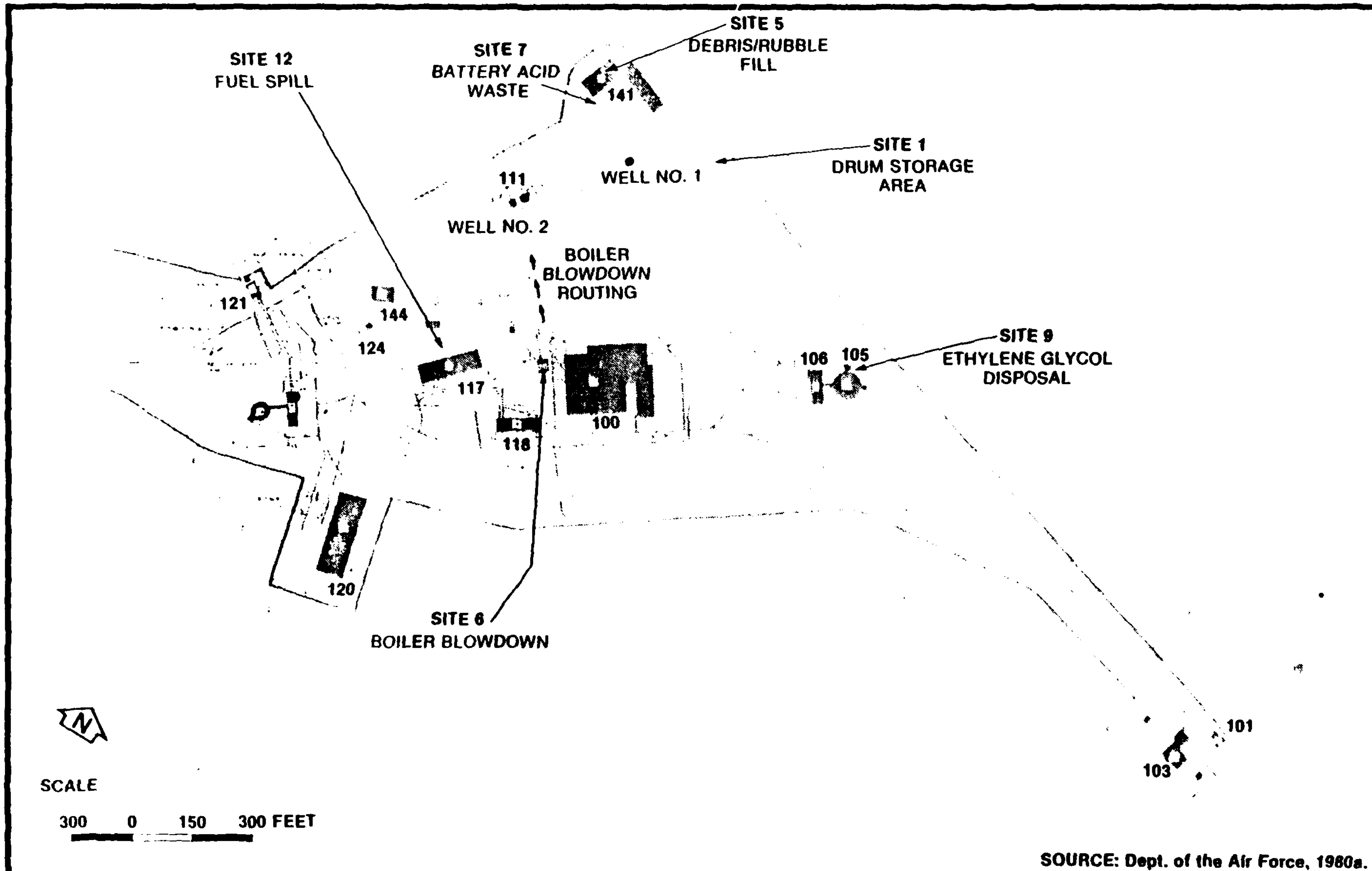
During a routine water quality analysis in 1980, TCE was found in a single sample from Well No. 2 at a concentration level of 1.2 micrograms/l. Because this level was below applicable maximum contaminant levels at that time, no confirmatory sampling of Well No. 2 was performed. No TCE was detected in Well No. 1 closer to the drum storage area. It is, therefore, not possible to directly correlate this single observation with any definite contaminant source.

Because of the use of the permeable unbermed area for temporary drum storage of waste chemicals and POL, the potential exists for contamination and contaminant migration toward the NBAFS potable water supply.

This site received a HARM score of 62.

5.2 SITE NO. 2: JOE ENGLISH POND REPORT DESIGNATION (JEP)

Joe English Pond was the primary bombing target at the site from 1942 to 1958. The pond bottom is covered by metal debris and bomb casings. Potentially many UXO exist in the sediments of the pond. Since there are possibly large numbers of unexploded bombs in a relatively small area (30 acres), potential exists for release of significant quantities of explosives residues as the casings corrode. Explosives and their transformation products are toxic or carcinogenic at low concentration levels. These levels range from 44.3 micrograms/l for TNT to 0.1 microgram/l for 2,4-DNT (this latter concentration represents the 10^{-6} risk level for drinking water and consuming aquatic organisms from waters containing 2,4-DNT). No analyses for explosives residues have been performed on the waters or sediments of Joe English Pond; the potential exists for contamination of these waters and sediments by explosives residues.



SOURCE: Dept. of the Air Force, 1980a.

Figure 5.0-2
DISPOSAL SITE LOCATIONS IN THE
DEVELOPED AREAS AT NBAFS

INSTALLATION
RESTORATION PROGRAM
NEW BOSTON AIR FORCE STATION

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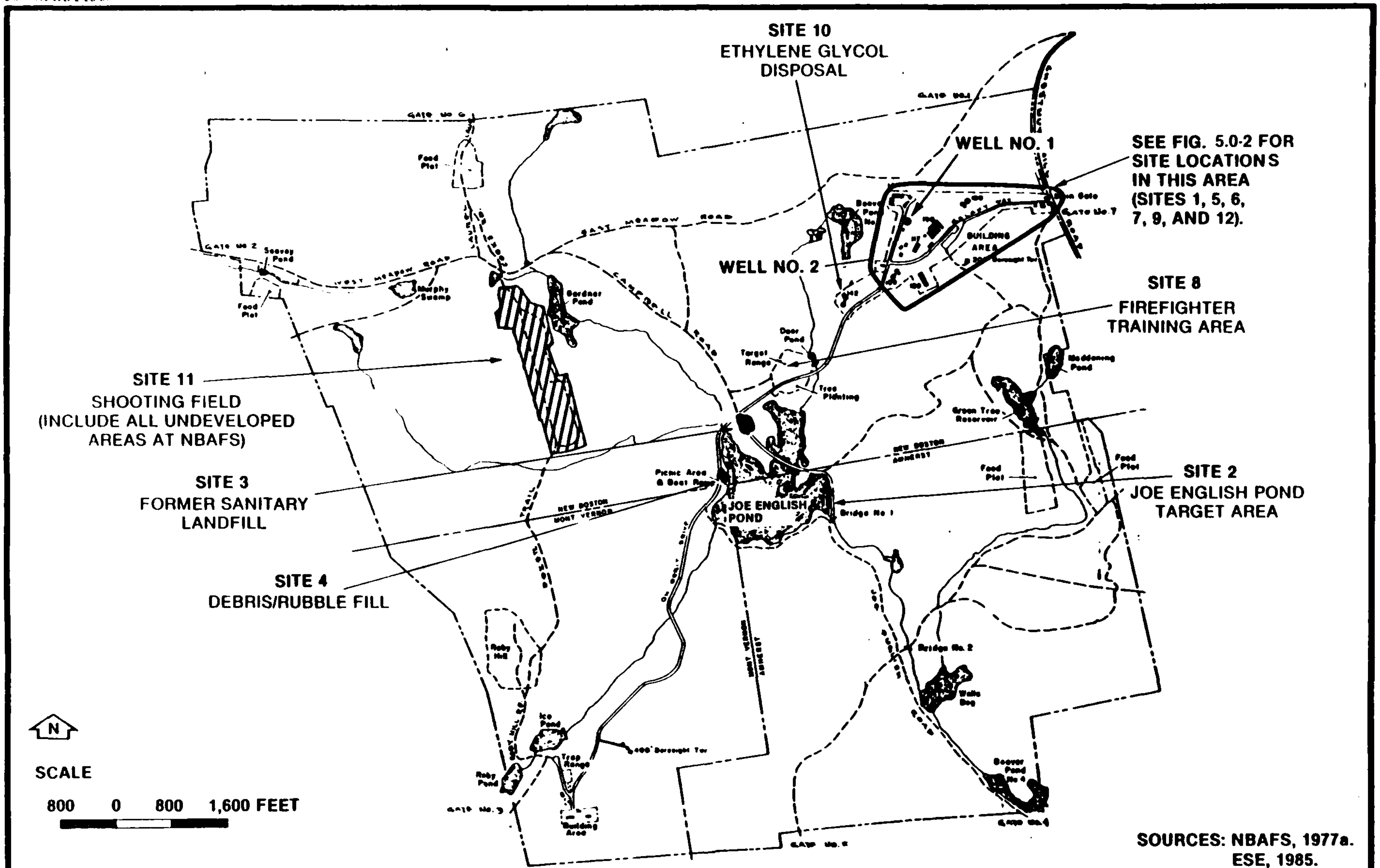

Figure 5.0-1
LOCATION OF DISPOSAL SITES ON NBAFS
(See Fig. 5.0-2)

INSTALLATION
RESTORATION PROGRAM
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Table 5.0-1. Summary of Potential Contamination Sites on NBAFS (Continued, Page 2 of 2)

Site No.	Site Description and Location Figure	Report Designation	Date of Operation or Occurrence	Conclusions
7	Stormwater Drainage System Disposal Site No. 2 (Battery Acid Waste) (Fig. 2)	SD-2	1974-present	No potential for significant residual contamination. Referred to base environmental program for assessing alternate disposal practices. No HARM rating. No Phase II studies recommended.
8	Firefighter Training Area (Fig. 1)	FTA-1	1974-present	No potential for residual contamination. All POL is contained in metal drums. No HARM rating. No Phase II studies recommended.
9	Chemical Disposal Site No. 2 (Fig. 2)	CS-2	1960-1974	No potential for residual contamination. Practice has ceased. No HARM rating. No Phase II studies recommended.
10	Chemical Disposal Site No. 3 (Fig. 1)	CS-3	1978-present	No potential for residual contamination. Practice has been referred to base environmental program for modification. No HARM rating. No Phase II studies recommended.
11	Shooting Field and Undeveloped Impact Areas (Fig. 1)	Not Applicable	1942-1958	No potential for significant residual contamination. No HARM rating. Referred to base environmental program for land use considerations.
12	Fuel Spill Site (Fig. 2)	FS-1	1976	No potential for residual contamination. One-time occurrence with complete containment of POL. No HARM rating. No Phase II studies recommended.

Source: ESE, 1985.

Table 5.0-1. Summary of Potential Contamination Sites on NBAFS

Site No.	Site Description and Location Figure	Report Desig-nation	Date of Operation or Occurrence	Conclusions
1	Chemical Spill/Disposal Site No. 1 (drum storage area) (Fig. 2)	CS-1	1974-1985	Potential for residual contamination and contaminant migration. Received HARM score of 62. Phase II studies recommended.
2	Joe English Pond (Fig. 1)	JEP	1942-1958	Potential for residual contamination and contaminant migration. Received HARM score of 61. Phase II studies recommended.
3	Landfill No. 1 (Fig. 1)	LF-1	1960-1968	Potential for residual contamination and contaminant migration. Received HARM score of 51. Phase II studies recommended.
4	Landfill No. 2 (Fig. 1)	LF-2	1960-1965	No potential for residual contamination. Debris landfill closed. No HARM rating. No Phase II studies recommended.
5	Landfill No. 3 (Fig. 2)	LF-3	1960-1965	No potential for residual contamination. Construction debris and rubble landfill closed. No HARM rating. No Phase II studies recommended.
6	Stormwater Drainage System Disposal Site No. 1 (Boiler Blowdown) (Fig. 2)	SD-1	1960-present	No potential for residual contamination. NPDES-permitted discharge. No HARM rating. No Phase II studies recommended.

5.0 CONCLUSIONS

The goal of the IRP Phase I study is to identify sites where there is potential for environmental contamination resulting from past waste disposal practices and to assess the potential for contaminant migration from these sites. The conclusions are based on the assessment of the information collected from the project team's field inspection; review of records and files; review of the environmental setting; and interviews with base personnel, past employees, and state and local government employees. Twelve potential contamination sources were identified at NBAFS. The evaluations of those sites are summarized in Table 5.0-1 and shown in Figs. 5.0-1 and 5.0-2. Evaluations and conclusions regarding the three sites that have a potential for contaminant migration and received HARM scores are detailed in the following paragraphs.

5.1 SITE NO. 1: CHEMICAL SPILL/DISPOSAL SITE NO. 1 REPORT DESIGNATION (CS-1)

As described in Sec. 4.2.3, a drum storage area has been located adjacent to the motor pool (Bldg. 141) and used intermittently since 1974 for storage of materials for salvage or to be turned into DPDO. At the time of the site visit, 37 drums were observed along with 6 lead-acid batteries. Several of the drums had "blown" or bulged tops. Because the site visit was in winter, it was not possible to determine whether the bulged conditions had resulted from previous volatilization of solvents or chemical reactions, or whether the bulging represented expansion of an aqueous solution by freezing within a full drum. Drum labels included paint slops, ethylene glycol, waste oil, fuel oil/water, and parts cleaning solvent. Several drums were unlabeled. Reportedly, only petroleum-based solvents are in use at NBAFS. No halogenated solvents (except freons) were observed during the site visit. Subsequent to the site visit, the drums and batteries have been moved by Detachment 2 to a secure area which is bermed, covered, and fenced to await disposal through DPDO.

The drum site is unbermed and is situated on a thin layer of permeable soil above fractured bedrock within 50 and 200 yards of Wells No. 1 and

Table 4.2-4. Summary of HARM Scores for Potential Contamination Sources on NBAFS

Site No.	Site	Report Designation	Receptor Subscore	Waste Characteristics Subscore	Pathway Subscore	Waste Management Factor	Overall Total Score
1	Chemical Disposal	CS-1	67	60	60	1.0	62
2	Joe English Pond	JEP	53	30	100	1.0	61
3	Landfill No. 1	LF-1	53	20	80	1.0	51

Source: ESE, 1985.

distances and water-level elevations. Water levels should be measured after well development and at the time of sampling. Slug tests should be conducted to determine horizontal permeability and to provide data for evaluation of flow rates.

Because of the potential that POL was spilled at Site 1, chemical analysis of the water should include specific analysis for petroleum hydrocarbons. The oil and grease analysis by EPA Method 413.2 (EPA, 1979) does not differentiate between extractables of biological origin (biogenic) or the mineral oils and greases of POL origin (petrogenic); therefore, the EPA Infrared (IR) Spectrophotometric Method for total recoverable petroleum hydrocarbons (EPA Method 418.1; EPA, 1979) is recommended for assessing POL contamination.

Because of the low levels of TCE (1.2 micrograms/l) found at Well No. 2, analysis at low levels by GC/MS (EPA, 1984) is required to screen for volatile compounds in Wells No. 1 and 2, to ensure that contamination from somewhat remote sources is detected. A similar rationale exists for the extractable organic analysis. In contrast, the monitor wells located at the immediate edges of the site may be screened using total organic halogens (EPA Method 9020), petroleum hydrocarbons (EPA Method 418.1), and total organic carbon (EPA Method 415.1). If significant contamination is present, leachate will contain high levels near the source. Because of the high permeabilities and net precipitation, rapid contaminant attenuation is likely beyond the boundaries of the disposal/spill areas.

SITE 2 AND SITE 3: JOE ENGLISH POND AND LANDFILL NO. 1

Monitoring programs for these two sites can be combined because of their adjacent location.

Quarterly monitoring of surface water of Site 2 is necessary to determine whether contaminants migrating from Site 3 are impacting the pond and to determine whether detectable explosive residues are present at any season in the pond. Contaminants in Joe English Pond waters can migrate off NBAFS and potentially affect the potable water supply for the town of Amherst. Because of safety considerations related to the UXO in Joe English Pond, sediment sampling is not recommended. Ground water monitoring for 1 year on a quarterly basis is also recommended. This program should consist of installation of one well upgradient of both Site 2 and Site 3, a well between the two sites, a well immediately downgradient of Site 3 between Site 3 and wetlands connecting to Joe English Pond, and a well downgradient of Site 2 located adjacent to the drainage channel of Joe English Brook. In addition, existing potable Well No. 3, located at the trailer recreation area, should be included in the monitoring program. Locations of the surface water monitoring point and the recommended monitor well locations are shown in Fig. 6.1-3. At the time the surface water is sampled, a water temperature profile should be made, and if thermal stratification is evident, a sample of both the upper layer of water (epilimnion) and the lower layer (hypolimnion) should be collected. The hypolimnion should be sampled at approximately 1 to 2 ft from the bottom. The geotechnical program (well installation/testing) should be the same as described for Site 1. The parameters to be analyzed include explosives residues by gas chromatography, petroleum hydrocarbons, total organic halogens, total organic carbon, metals, and volatile and extractable organic compounds by GC/MS. The analytical matrix and methods are presented in Table 6.1-3. As shown in this table, the landfill monitor wells, placed immediately downgradient of Site 3, will be analyzed for screening parameters (total organic halogens, total organic carbon, petroleum hydrocarbons, and metals). Wells downgradient of Site 2 will be analyzed for explosives. Since the ground water discharge and outflow from Joe English Pond would be expected to contain diluted concentrations of any contaminants migrating from the landfill, more sensitive GC/MS methods are required. Explosives residues will be analyzed in this surface water sample.

6.2 RECOMMENDED GUIDELINES FOR LAND USE

It is desirable to have land use restrictions for the identified disposal sites for the following reasons: (1) to provide the continued

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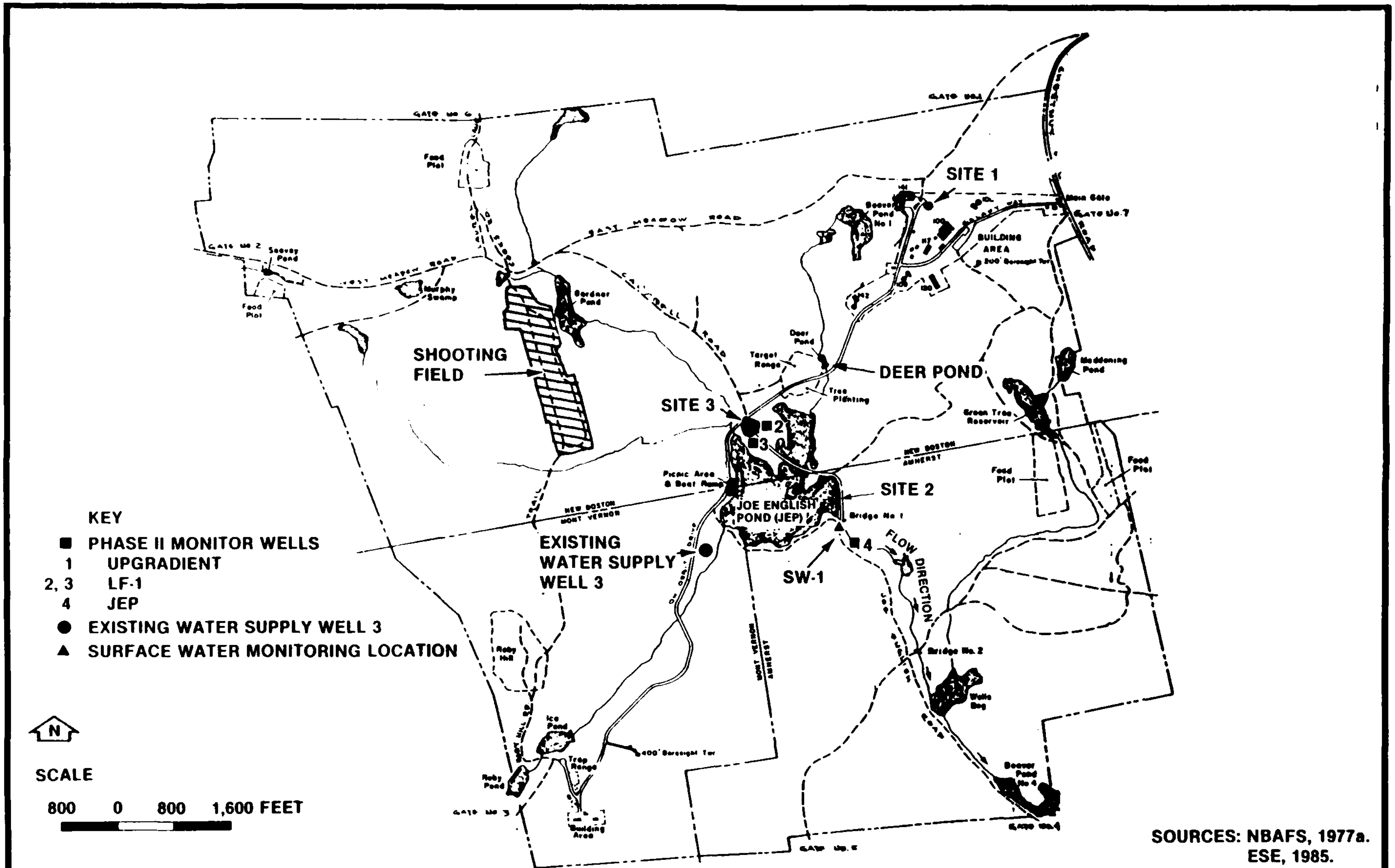

Figure 6.1-3
LOCATIONS OF PHASE II MONITORING WELLS AND SURFACE WATER MONITORING LOCATIONS FOR SITES 2 AND 3

INSTALLATION RESTORATION PROGRAM
NEW BOSTON AIR FORCE STATION

Table 6.1-3. Monitoring Requirements of Joe English Pond (JEP) and Landfill No. 1 (LF-1)

Sample Type and Location (see Fig. 6.1-2)	Parameters
SW-1 Surface Water	Volatile organics by GC/MS; EPA Method 624* Extractable organics by GC/MS; EPA Method 625*
Potable Water Well No. 3 and Joe English Pond (Site 2) Monitor Well No. 4	Explosive Residues by GC/EC, USATHAMA Method C2† Metals Pb, Cd, Zn, Cu, Cr by ICP; EPA Method 200.7** Mercury by cold vapor-AA, EPA Method 245.1** Arsenic by Anhydride AA; EPA Method 206.3**
Site 3 Monitor Wells No. 2 and 3	Total organic halogens (TOX); EPA Method 9020†† Total organic carbon (TOC); EPA Method 415.1** Petroleum hydrocarbons by IR; EPA Method 418.1** Metals Pb, Zn, Cd, Cu, Cr, by ICP; EPA Method 200.7** Mercury by cold vapor AA; EPA Method 245.1** Arsenic by Anhydride AA; EPA Method 206.3**
Monitor Well No. 1 (Upgradient)	Volatile organics by GC/MS; EPA Method 624* Extractable organic by GC/MS; EPA Method 625* Explosives residues by GC/EC; USATHAMA Method C2† Metals Pb, Cd, Cu, Zn, Cr, by ICP; EPA Method 200.7** Mercury by cold vapor AA; EPA Method 245.1** Arsenic by Anhydride AA; EPA Method 206.3**

Notes: All samples quarterly.
GC/MS = Gas Chromatography/Mass Spectroscopy.
AA = Atomic Absorption Spectroscopy.
ICP = Inductively Coupled Argon Plasma.
GC/EC = Gas Chromatography/Electron Capture Detector.

Sources: *EPA, 1984. 49 Federal Register, No. 209, pp 141-174.
†USATHAMA, 1984. Method No. C2, Nitroaromatics in Water. U.S. Army Toxic and Hazardous Materials Agency, Technology Division, Aberdeen Proving Ground, Md.
**EPA, 1979. Methods for Chemical Analysis of Water and Wastes EPA-600/4-79-020.
††EPA, 1983. Test for Evaluating Sol. Waste Management, Physical-Chemical Method SU-86, 2nd Edition.

protection of human health, welfare, and the environment; (2) to ensure that the migration of potential contaminants is not promoted through improper land uses; (3) to facilitate the compatible development of future USAF facilities; and (4) to allow for identification of property which may be proposed for excess or outlease. It should be noted that any outlease or excessing of NBAFS requires careful consideration. Clearing and decontamination to remove UXO and the granting of clearance certificates would involve considerable expense (NBAFS, 1983a). A preliminary assessment of costs for UXO clearing of the recreational areas was estimated to be 250,000 to 300,000 per acre. However, depending on the degree of contamination, the cost would be considerably greater. Excessing is prohibited without certification that the land is cleared of any and all explosives. Approximately 2,200 acres remain uncleared (NBAFS, 1981).

At the present time, NBAFS provides certain restricted recreation areas for NBAFS employees and other military personnel. Currently, canoeing and boating with electric motors or oars only, is permitted in Joe English Pond. Fishing is permitted in Joe English Pond and at other stocked ponds and streams on the installation. Swimming and diving are not permitted on Joe English Pond. Limited hiking and cross-country ski trails and picnic grounds are provided. These areas are inspected on a periodic basis to ensure that no UXO have come to the surface. Persons utilizing the facilities are instructed to stay away from suspected UXO and to report any finds to the Fire Chief's office. Increased recreational use is projected for NBAFS's undeveloped areas. New areas are projectd to be tested for potential UXO prior to use.

The recommended guidelines for land use restrictions at the three identified disposal sites at NBAFS are presented in Table 6.2-1. Descriptions of the land use restriction guidelines are presented in Table 6.2-2. Land use restrictions at these sites should be reevaluated upon completion of the Phase II monitoring program, and changes should be made where appropriate.

Table 6.2-1. Recommended Guidelines for Future Land Use at the Three Potential Contamination Sites

Site	Construction on the site	Excavation	Well construction on or near the site	Agricultural use	Silvicultural use	Water infiltration (runon, ponding, irrigation)	Recreational use	Burning or ignition source	Disposal operations	Vehicular traffic	Material storage	Housing on or near the site
	Recommended Guidelines for Future Land Use											
Chemical Spill/Disposal Site (Site 1)	R*	R	R	NA	NA	NA	R	NR	R	NR	NR	NR
Joe English Pond (Site 2)	NA	R	R	NA	NA	NA	R	NA	R	R	NA	R
Landfill No. 1 (Site 3)	R	R	R	NR	R	R	NR	NR	R	NR	NR	NR

*Since no burial of material occurred at CS-1, construction on the site is not restricted. However, construction at the site may impact proper Phase II contamination assessment and possible remedial action.

Key:
R = Restriction.
NR = No restriction.
NA = Not applicable.

Note: See Table 6.2-2 for definitions of land use restrictions.

Source: ESE, 1985.

Table 6.2-2. Descriptions of Guidelines for Land-Use Restrictions

Guideline	Description
Construction on the site	Restrict the construction of structures which make permanent (or semipermanent) and exclusive use of a portion of the site's surface.
Excavation	Restrict the disturbance of the cover or subsurface materials.
Well construction on or near the site	Restrict the placement of any wells (except for monitoring purposes) on or within a reasonably safe distance of the site. This distance will vary from site to site, based on prevailing soil conditions and ground water flow.
Agricultural use	Restrict the use of the site for agricultural purposes to prevent food-chain contamination.
Silvicultural use	Restrict the use of the site for silvicultural uses (root structures could disturb cover or subsurface materials).
Water infiltration	Restrict water runon, ponding, and/or irrigation of the site. Water infiltration could produce contaminated leachate.
Recreational use	Restrict the use of the site for recreational purposes (see page 6-11).
Burning or ignition sources	Restrict any and all unnecessary sources of ignition, due to the possible presence of flammable compounds.
Disposal operations	Restrict the use of the site for waste disposal operations, whether above or below ground.
Vehicular traffic	Restrict the passage of unnecessary vehicular traffic on the site due to the presence of explosive material(s) and/or of an unstable surface.
Material storage	Restrict the storage of any and all liquid or solid materials on the site.
Housing on or near the site	Restrict the use of housing structures on or within a reasonably safe distance of the site.

Source: ESE, 1985.

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APPENDIX A

GLOSSARY OF TERMINOLOGY, ABBREVIATIONS, AND ACRONYMS

APPENDIX A
GLOSSARY OF TERMINOLOGY, ABBREVIATIONS, AND ACRONYMS

AA	Atomic Absorption Spectroscopy
ADI	Acceptable daily intake
AFB	Air Force Base
AFBMD	Air Force Ballistic Missile Division
AFCC	Air Force Communications Command
AFSC	Air Force Systems Command
AFSCF	Air Force Satellite Control Facility
AMC	Air Materiel Command
ARDC	Air Research and Development Command
ARPA	Advanced Research Projects Agency
bls	Below land surface
BOD_5	Biochemical oxygen demand
BSD	Ballistics Systems Division
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CS	Communications Squadron
DEQPPM	Defense Environmental Quality Program Policy Memorandum
Det.	Detachment
DNT	2,4- and 2,6-dinitrotoluene
DOD	Department of Defense
DPDO	Defense Property Disposal Office
EOD	Explosives Ordnance Detachment
EPA	U.S. Environmental Protection Agency

ESE	Environmental Science and Engineering, Inc.
FACC	Ford Aerospace and Communications Corp.
ft	feet
FWS	U.S. Fish and Wildlife Service
gal	gallon(s)
gal/yr	gallon(s) per year
GC/MS	Gas chromatography/mass spectroscopy
gpd	gallon(s) per day
HARM	Hazard Assessment Rating Methodology
HMX	octahydro-2,4,6,8-tetranitro-2,4,6,8-tetrazine
HQ	Headquarters
ICBM	Intercontinental ballistic missile
ICP	Inductively Coupled Argon Plasma
IOC	Initial operating capability
IR	Infrared
IRBM	Intermediate-range ballistic missile
IRP	Installation Restoration Program
LAAFS	Los Angeles Air Force Station
lb	pound(s)
lb/yr	pound(s) per year
MCL	Maximum contaminant level
mg	milligram(s)
mg/l	milligram(s) per liter
micrograms/l	microgram(s) per liter
ml	milliliters
mm	millimeter(s)
MOGAS	motor gasoline

APPENDIX D

ORGANIZATIONS, MISSIONS, AND TENANT ACTIVITIES

PRIMARY ORGANIZATION

Det. 2, AFSCF operates and maintains NBAFS facilities and provides time-critical space vehicle operations for global commanding and control.

TENANT

Det. 1, 2014th Communications Squadron (AFCC) provides a high data rate transmission and reception capability at NBAFS for supporting AFSCF operations.

CONTRACTORS

FACC provides operation and maintenance services and serves as the integrating contractor representative. Sperry Corp. serves as the computer maintenance representative. Systems Development Corp. operates as resident software representative. RWTA Security provides security services for NBAFS.

APPENDIX D

ORGANIZATIONS, MISSIONS, AND TENANT ACTIVITIES

APPENDIX C
OUTSIDE AGENCY CONTACTS

New Hampshire Water Supply and Pollution Control Commission
Health and Welfare Bldg.
Hazen Drive
P.O. Box 95
Concord, NH 03301
(603) 271-3503

New Hampshire Bureau of Solid Waste Management
Division of Public Health Services
Health and Welfare Bldg.
Hazen Drive
Concord, NH 03301
(603) 271-4611

New Hampshire Environmental Protection Division
Office of Attorney General
State House Annex
25 Capitol Street
Concord, NH 03301
(603) 271-3679

U.S. Environmental Protection Agency Region 1 (Boston)
John F. Kennedy Federal Building
Boston, MA 02203
(617) 223-5050

U.S. Environmental Protection Agency STORET
Data Base, Computer Access

Albert F. Simpson Historical Research Center
Maxwell AFB, Alabama

National Archives
Modern Military Branch
Washington, D.C.

Robert I. Davis, State Geologist
James Hall
University of New Hampshire
Durham, NH 03824
(603) 862-1216

U.S. Geological Survey
1200 South Eads Street
Arlington, VA 22202
(703) 557-2751

APPENDIX C

LIST OF INTERVIEWEES

Interviewee		Years of Service at NBAFS
1.	Pipefitter/Civil Engineering (CE)	1
2.	Contract Engineer/FACC (Chief of Support)	25
3.	Carpenter/CE	17
4.	Base Civil Engineer (Retired)	22
5.	Motor Pool Employee (Retired)	6
6.	Environmental Planner/Forester/CE	1
7.	Environmental Engineer/CE	2
8.	Chief of Operations/CE	6
9.	Bioenvironmental Engineer/Hanscom AFB, MA	4
10.	Chief Emergency Services Branch (spent 15 years as Fire Chief at Grenier AFB)	11
11.	Plumber/CE	25
12.	Electrician/CE	25
13.	Chief of Logistics	7

APPENDIX C

LIST OF INTERVIEWEES AND OUTSIDE AGENCY CONTACTS

EDUCATION

B.S. 1982 Environmental Engineering University of Florida

AFFILIATIONS

American Water Works Association

HONORS

Received Presidential Recognition Certificate for Outstanding Contribution from Florida, May 1982.

DOUGLAS A. DEAN, B.S.
Associate Engineer

ESE PROFESSIONAL RESUME

SPECIALIZATION

Environmental Engineering, Water and Waste Treatment Processes, Pulp and Paper Technology, and Treatability Studies for the Pesticide Industry

RECENT EXPERIENCE

Okeechobee Water Works THM Control Study, Subproject Manager--Conducted bench-scale testing to determine optimum treatment process for THM reduction or removal. THM control alternatives most likely to meet regulatory requirements were identified and evaluated.

Bonita Springs Water Plant Upgrade, Project Engineer--Performed jar testing to determine optimum lime doses for softening. Project included THM sampling and analyses throughout plant.

Tampa Electric Company (TECO) Coagulation Study, Project Engineer--Conducted bench-scale evaluation of various polymers for the removal of iron from the slag pond at TECO's Big Bend Station. Assisted in a feasibility assessment of the various coagulation/sedimentation treatment systems, along with the respective cost estimates for each.

Golden Gate, Florida, Softening Plant Evaluation, Project Engineer--Assisted in the evaluation of 1.4-MGD softening plant's performance with respect to turbidity, THM formation potential, and color removal. Assisted in additional plant-scale studies to verify THM and color control techniques.

Water Treatment Plant THM Control Study, Project Engineer--Conducted bench-scale testing to determine optimum treatment process for THM precursor removal. Investigated short-term chlorination followed by ammoniation as a THM control strategy.

Plant Operating Study, Project Engineer--Study involved assessing the potential for uprating the capacity of existing treatment plant by optimizing plant process. THM control alternatives were also investigated.

U.S. EPA Effluent Limitations Guidelines for the Pesticide Industry, Project Engineer--Responsible for developing the technical support used to establish U.S. EPA's effluent guidelines for the pesticide industry. Evaluated industry comments and data and incorporated new information into the data base. Analyzed treatment and treatability information pertinent to the industry for the purpose of determining plant-specific pollutant concentrations deemed achievable for each pesticide manufactured.

U.S. Air Force Installation Restoration Program, Project Geologist--Installation assessment of Columbus, Andersen, and Vandenburg Air Force Bases. Responsible for geohydrologic evaluation of sanitary and solid waste disposal areas, and the potential for off-post migration.

Minerals Management Service, Project Geologist--Responsible for sediment core and sediment trap analysis for evaluation of sediment transport in selected areas of the Gulf of Mexico.

University of Florida, Research Associate--Texaco U.S.A.- funded research grant involving the development of a method of increasing BTU values in autochthonous mineral-rich peats and organic sediments.

Department of Energy and Governor's Energy Office, State of Florida, Research Assistant--Florida fuel grade peat assessment program conducted through the University of Florida; involved sampling, mapping, and analysis of Florida fuel peat resources.

EDUCATION

M.S.	1983	Geology	University of Florida
B.S.	1981	Geology	State University of New York

AFFILIATIONS

American Association of Petroleum Geologists--Energy Minerals Division
Geological Society of America
Southeastern Geological Society
Society of Economic Paleontologists and Mineralogists

ESE

PROFESSIONAL RESUME

DONALD F. McNEILL, M.S.
Associate Scientist

SPECIALIZATION

Hydrogeology, Ground Water Monitoring and Evaluation, Clastic Sedimentology, Carbonate Sedimentology, Peat and Organic Sediment Analysis, Geomorphology, Stratigraphy, Field Mapping, and Sampling Techniques

RECENT EXPERIENCE

U.S. Army Toxic and Hazardous Materials Agency, Project Geologist--Installation assessment of Ft. Riley, Kansas. Geohydrologic assessment of present and past waste disposal methods, responsible for evaluation of the potential for migration of contaminants in the subsurface.

U.S. Army Toxic and Hazardous Materials Agency, Project Geologist--Installation assessment of Military District of Washington. Geohydrologic assessment of present and past waste disposal methods, responsible for evaluation of the potential for migration of contaminants in the subsurface.

U.S. Army Toxic and Hazardous Materials Agency, Project Geologist--Installation assessment of West Virginia Ordnance Works. Geologic and ground water investigation of past waste disposal methods. Responsible for evaluation of ground water contamination and off-post contaminants migration.

Florida Department of Environmental Regulation, Site Contamination Assessment, Project Hydrogeologist--Investigated organic and inorganic contamination at City Chemical Company, Orlando, Florida. Assessment of shallow aquifer with respect to contaminant migration.

EDB Contamination Investigation, Project Hydrogeologist--Investigated EDB contamination of drinking water wells at Sanford, Florida, including drilling and field sampling, installation of piezometers, measuring water levels and sampling wells, evaluating alternatives, and preparing report.

Adcom Wire Company, Project Hydrogeologist--Development of a ground water monitoring plan for a wire galvanizing plant including site analysis, geohydrology, and proposed ground water monitoring network.

Orange County, Project Hydrogeologist--Development of a ground water monitoring plan for a sanitary landfill near Orange, Florida. Project consisted of monitor well installation, measuring water levels, geohydrologic evaluation and report preparation.

Evaluation of Methods for Wetlands Transition Zones Evaluation, COE, Project Director--Project Director for the assessment of procedures for determining the wetland/upland transition zones in Florida and in Louisiana. Provided overall project guidance and direction for two separate projects/tasks.

Evaluation of Toxicant Extraction Procedures, Project Manager--Provided a review of toxicant extraction leaching procedures. Included EP toxicity tests, ASTM procedures, and University of Wisconsin test as a response to an EPA call for comment on the RCRA extraction procedure, as it relates to the cement industry.

Environmental Survey and Cleanup of PCB-Contaminated Equipment Maintenance Yard, Quality Assurance Manager--Supervised quality control procedures for field sampling and onsite laboratory analytical effort to determine the extent of PCB contamination in soils and surface waters for Arkansas Power and Light Company. Approximately 300 soil samples were taken over a period of 6 days using extremely sensitive procedures to avoid cross-contamination of samples and to delineate the areal extent of contamination.

Development of Water Quality Criteria for Selected Munitions Compounds, Subproject Manager--Participated in surveys of TNT and RDX/HMX environmental impact and development of water quality criteria for selected military munitions: nitrocellulose, glycerol trinitrate (nitroglycerin), RDX and HMX, and white phosphorus (P4), under contract to the U.S. Army Medical Research and Development Command.

Chemistry/Environmental Fate--Helped to develop a program to investigate the ecology and physiology of bacteria which form nitrogen-fixing symbioses with tropical grasses.

EDUCATION

Ph.D.	1977	Environmental Engineering Sciences	University of Florida
M.S.	1968	Environmental Engineering Sciences	University of Florida
B.S.	1965	Biological Sciences	Purdue University

COMMITTEES

Member, Standard Methods Committee for Periphyton; AWWA, APHA, WPCF

PUBLICATIONS

Fourteen technical publications in the fields of environmental fate of munitions compounds, limnology and water disinfection.

MICHAEL A. KEIRN, Ph.D.
Senior Scientist

ESE PROFESSIONAL RESUME

SPECIALIZATION

Hazardous Waste Management, Aquatic/Wetland Ecology, Microbiology, Water Quality

RECENT EXPERIENCE

Environmental Contamination Survey of Vint Hill Farms Station, Project Manager--Exploration survey of ground water and surface water contamination migration (metals, cyanide, phenol, solvents) at a U.S. Army installation in Virginia. Disposal sites include landfill, former lagoon, and land industrial sludge disposal area. Responsible for cost control, schedule, coordination of field/laboratory activities, quality control, and contamination assessment report.

Environmental Survey of Gateway Army Ammunition Plant, Project Manager--Confirmatory study of PCB, metals, asbestos, solvents contamination of buildings, sewers, and soils at U.S. Army installation due for excessing action. Responsible for cost control, schedule, coordination of sampling and analysis, and contamination assessment.

Environmental Survey and Decontamination Plan for Alabama Army Ammunition Plant, Project Manager--10-manyear hazardous waste exploratory and confirmatory sampling and analysis survey of a 5,000-acre U.S. Army munitions plant. Responsible for cost control, schedules, quality control, field survey crew training, and coordination of analytical methods development for complex nitro-organics. Survey addressed contamination of soil, surface water, sediment, ground water, biota, and man-made structures.

Initial Assessment Studies for the Naval Energy and Environmental Support Activity, Project Chemist/Ecologist--Evaluated a Naval installation with regard to past hazardous waste generation, storage, treatment, and disposal practices. Investigations include records review, aerial and ground site surveys, employee interviews, and limited sampling and analysis. Determine extent of contamination at former disposal/spill sites, potential for contaminant migration, and potential effects on human health and the environment.

Assessment of Potential Biological Effects of a Pulp Mill Discharge on the Flint River, Project Director--Principal investgation for the conduct of acute and chronic toxicity studies for eight animal and algal species to treated effluent. Responsible for overall direction of project, client interaction, and development of assessment. Required both onsite and laboratory toxicity studies.

APPENDIX B

TEAM MEMBER BIOGRAPHICAL DATA

SATCOM	Satellite Communications
SCS	U.S. Soil Conservation Service
SD	Space Division
SGLS	Space Ground Link System
SSD	Space Systems Division
STA	Satellite Tracking Annex
STC	Satellite Test Center
STORET	Storage and retrieval
STS	Space Transportation System
TCE	trichloroethylene
TDS	Total dissolved solids
TNB	1,3,5-trinitrobenzene
TNT	2,4,6-trinitrotoluene
umhos/cm	micromhos per centimeter
USAF	U.S. Air Force
USAMBRDL	U.S. Army Medical Bioengineering Research and Development Laboratory
UXO	unexploded ordnance
WDD	Western Development Division
WS	Weapon system
yr	year(s)

mph	miles per hour
MSL	Mean sea level
NAS	National Academy of Sciences
NASA	National Aeronautics and Space Administration
NBAFS	New Boston Air Force Station
NIPDWR	National Interim Primary Drinking Water Regulation
NOAA	National Oceanic and Atmospheric Administration
NPDES	National Pollutant Discharge Elimination System
NRC	U.S. Nuclear Regulatory Commission
NSDWR	National Secondary Drinking Water Regulations
NWS	National Weather Service
OEHL	Occupational and Environmental Health Laboratory
oz	ounce(s)
PCB	Polychlorinated biphenyl--liquid used as a dielectric in electrical equipment; suspected human carcinogen; bioaccumulates in the food chain and causes toxicity to higher trophic levels
pCi/l	picocurie(s) per liter
PMEL	Precision Measurement Equipment Laboratory
POL	Petroleum, oils, and lubricants
PVC	Polyvinyl chloride
QC	Quality control
RCRA	Resource Conservation and Recovery Act
RDX	hexahydro-1,3,5-trinitro-1,3,5-triazine
SAC	Strategic Air Command
SAFS	Sunnyvale Air Force Station
SAMSO	Space and Missile Systems Organization

APPENDIX E

MASTER LIST OF SHOPS AND LABS

APPENDIX E
MASTER LIST OF SHOPS AND LABS

Shop Name	Current Location (Bldg. No)	Handles Hazardous Materials	Generates Hazardous Wastes	Typical Treatment
DET. 2, AFSCF				
CIVIL ENGINEERING				
Electrical Shop	117	Yes	Yes	Contract disposal
Mechanical Shop	100	Yes	Yes	Contract disposal
Roads and Grounds	117	Yes	Yes	Contract disposal
Heating/Refrigeration	100	No	Yes	Contract disposal
Paint Shop	124	Yes	Yes	Contract disposal
Plumbing Shop	117	No	No	
Sewage Treatment	121	No	No	
EMERGENCY SERVICES BRANCH				
Fire Department	103	Yes	No	
Hobby Shop	141	No	Yes	Contract disposal
LOGISTICS BRANCH				
Motor Pool	141	Yes	Yes	Neutralization, contract disposal
DET. 1, 2014TH COMMUNICATIONS SQUADRON				
Antenna Facility	142	Yes	Yes	Contract disposal poured onsite on ground
FORD AEROSPACE AND COMMUNICATIONS CORP.				
Computer Complex	100	No	No	
PMEL Calibration	100	Yes	Yes	Contract disposal
Telemetry	100	Yes	No	
Antenna (46 ft)	108	No	Yes	Contract disposal
Antenna (60 ft)	106	No	Yes	Contract disposal
Communications Center	100	Yes	No	
Quality Control Lab	100	No	Yes	Contract disposal
SPERRY CORP.				
Computer Maintenance	100	No	No	
SYSTEMS DEVELOPMENT CORP.				
Software Training	100	No	No	

APPENDIX F

WATER QUALITY DATA

N.B. 46/ ...

DEPARTMENT OF THE AIR FORCE
USAF CLINIC HANSCOM (AFSC)
HANSCOM AIR FORCE BASE, MASSACHUSETTS 01731

REPLY TO ATTN OF: ESD/SGPM (AV 478-2182) 10 July 1980

SUBJECT: Potable Water Analyses for Trihalomethanes and Volatile Organics

TO: Det 2, AFSCF/CC (Lt Col Smith)
Det 2, AFSCF/DE (Capt Tigerman)
IN TURN

Attached are OEHL laboratory reports for Trihalomethane and Trichloroethylene analyses of the potable water supply at New Hampshire Satellite Tracking Station. Raw water from both the #1 and #2 wells were found to contain less than the USAF maximum permissible level of Trichloroethylene, i.e. 280 μg/l. Total Trihalomethane concentrations in the distribution system were determined to be well below the USEPA maximum permissible limit of 100 μg/l.

FOR THE COMMANDER

Edward F Maher

EDWARD F. MAHER, Capt, USAF, BSC
OIC, Bioenvironmental Engineering

3 Atchs
1. OEHL Report #66590
2. OEHL Report #66591
3. OEHL Report #66592

RECEIVED

JUL 15 1980

BCE

0712

2. LABORATORY PERFORMING ANALYSIS	3. LAB SAMPLE NUMBER	4. REQUESTOR SAMPLE NUMBER
	66590 XX [illegible] 00008	[redacted] 3200158 00C29

SAMPLE COLLECTION INFORMATION		5. DATE RECEIVED BY LAB	6. DATE ANALYSIS COMPLETED
7. SITE DESCRIPTION: Building 111, New Boston AFS, Well #2 (Well head)			27 June 1980

8. SITE LOCATION NO	9. FLOWRATE AT SITE 00058 GAL/MIN	10. WEATHER 00041
425802071373201		8

11. COLLECTION DATE/PERIOD	12. NAME OF COLLECTOR
9 Jun 1980 1125 hrs	Klett

13. SAMPLING TECHNIQUE	14. PHONE NUMBER
Grab	AV 478-2181/2

Special Sample, Volatile Organics Screening Program

NPDES #

ON-SITE ANALYTICAL RESULTS

16. WATER TEMP	17. PH	18. DISS O_2
9 00010 °C	6.8 00400 UNITS	N/A 00300 MG/L

19. RESULTS OF OTHER ON-SITE ANALYSES

ANALYSES REQUESTED AND RESULTS

A. PRIMARY DRINKING WATER STANDARDS (40CFR 141) (Preservation Group H)

PARAMETER	TOTAL	µG/L	MAX LEV ALLWD	PARAMETER	TOTAL	µG/L	MAX LEV ALLWD
ENDRIN	39390		0.2 µG/L	2, 4-D	39730		100 µG/L
LINDANE	39782		4 µG/L	2,4, 5-TP SILVEX	39760		10 µG/L
METHOXYCHLOR	39480		100 µG/L	Trichloroethylene		1.2	280.0
TOXAPHENE	39400		5 µG/L	One only			

B. NON-POTABLE WATER ANALYSIS FOR PESTICIDES (Preservation Group H)

PARAMETER	TOTAL	µG/L	PARAMETER	TOTAL	µG/L	PARAMETERS (SPECIFY)	µG/L
ALDRIN	39330		METHOXYCHLOR	39480			
CHLORDANE	39350		TOXAPHENE	39400			
DDT ISOMERS	39370		2,4-D	39730			
DIELDRIN	39380		2,4,5-TP SILVEX	39760			
ENDRIN	39390						
HEPTACHLOR	39410						
HEPTACHLOR EPOXIDE	39420						
LINDANE	39782						

JUN 13 10 39 AM '80

1. ORGANIZATION REQUESTING ANALYSIS

ESD/USAF Clinic/SGPM Stop-24
Hanscom AFB, MA 01731

REMARKS: Single Sample. [redacted]
Sample maintained at 4°C from time of collection until shipping at which time all samples were packed in ice for shipment.

CHEMIST: L. P. George

REVIEWED BY: JAMES A. COLLINS, MAJOR USAF, BSC, CHIEF, QUALITY ASSURANCE

APPROVED BY: [signature]

OEHL FORM NOV 76 3 ☆ U. S. GOVERNMENT PRINTING OFFICE 1979-672-397 **WATER ANALYSIS FOR PESTICIDES**

07.12

2. LABORATORY PERFORMING ANALYSIS	3. LAB SAMPLE NUMBER	4. REQUESTOR SAMPLE NUMBER
	66591	32800159 00029

SAMPLE COLLECTION INFORMATION

7. SITE DESCRIPTION: Well #1, NH. New Boston AFS (Sample in manhole at well head)
5. DATE RECEIVED BY LAB:
6. DATE ANALYSIS COMPLETED: 27 June 1980
8. SITE LOCATION NO: 425802071373202
9. FLOWRATE AT SITE 00058 GAL/MIN:
10. WEATHER 00041: 8

ON-SITE ANALYTICAL RESULTS

16. WATER TEMP: 9 00010 °C
17. PH: 6.8 00400 UNITS
18. DISS O_2: N/A 00300 MG/L
19. RESULTS OF OTHER ON-SITE ANALYSES:

11. COLLECTION DATE/PERIOD: 9 June 1980 1144 hrs
12. NAME OF COLLECTOR: Klett
13. SAMPLING TECHNIQUE: Grab
14. PHONE NUMBER: AV 478-2181/2
15. REASON FOR SAMPLE SUBMISSION: Special Sample, Volatile Organics Screening Program.

ANALYSES REQUESTED AND RESULTS

A. PRIMARY DRINKING WATER STANDARDS (*40CFR 141*) (Preservation Group H)

PARAMETER	TOTAL	µG/L	MAX LEV ALLWD	PARAMETER	TOTAL	µG/L	MAX LEV ALLWD
ENDRIN	39390		0.2 µG/L	2, 4-D	39730		100 µG/L
LINDANE	39782		4 µG/L	2,4, 5-TP SILVEX	39760		10 µG/L
METHOXYCHLOR	39480		100 µG/L	Trichloroethylene		N.D.<1.0	
TOXAPHENE	39400		5 µG/L	one only		ND. None Detected. Less Than The Quantitative Detection Limit.	

10 AM '80

B. NON-POTABLE WATER ANALYSIS FOR PESTICIDES (Preservation Group H)

PARAMETER	TOTAL	µG/L	PARAMETER	TOTAL	µG/L	PARAMETERS (SPECIFY)	µG/L
ALDRIN	39330		METHOXYCHLOR	39480			
CHLORDANE	39350		TOXAPHENE	39400			
DDT ISOMERS	39370		2,4-D	39730			
DIELDRIN	39380		2,4,5-TP SILVEX	39760			
ENDRIN	39390						
HEPTACHLOR	39410						
HEPTACHLOR EPOXIDE	39420						
LINDANE	39782						

1. ORGANIZATION REQUESTING ANALYSIS
ESD/USAF Clinic/SGPM Stop-24
Hanscom AFB, MA 01731

REMARKS: Single Sample Submitted.
Sample maintained at 4°C from collection
until packaged in ice for shipment.

CHEMIST: L. P. George

REVIEWED BY: MAJOR, USAF, ... CHIEF, ...

APPROVED BY: [signature]

OEHL FORM NOV 76 3 ☆ U.S. GOVERNMENT PRINTING OFFICE 1979-672-397 **WATER ANALYSIS FOR PESTICIDES**

07.12

2. LABORATORY PERFORMING ANALYSIS	3. LAB SAMPLE NUMBER	4. REQUESTOR SAMPLE NUMBER
	66592 .00006	32800160 00028

SAMPLE COLLECTION INFORMATION

7. SITE DESCRIPTION	Bldg 100 New Boston AFS, Distribution Sample XXXXX
5. DATE RECEIVED BY LAB	
6. DATE ANALYSIS COMPLETED	27 June 1980
8. SITE LOCATION NO	425809071374101
9. FLOWRATE AT SITE 00058 GAL/MIN	
10. WEATHER 00041	8
11. COLLECTION DATE/PERIOD	9 June 1980 1214 hrs
12. NAME OF COLLECTOR	Klett
13. SAMPLING TECHNIQUE	Grab
14. PHONE NUMBER	AV 478-2181/2
15. REASON FOR SAMPLE SUBMISSION NPDES #	Special Sample, Volatile Organics Screening Program

ON-SITE ANALYTICAL RESULTS

16. WATER TEMP 00010 °C	17. PH 00400 UNITS	18. DISS O_2 00300 MG/L
17	6.8	N/A

19. RESULTS OF OTHER ON-SITE ANALYSES

ANALYSES REQUESTED AND RESULTS

A. PRIMARY DRINKING WATER STANDARDS *(40CFR 141)* (Preservation Group H)

PARAMETER	TOTAL	µG/L	MAX LEV ALLWD	PARAMETER	TOTAL	µG/L	MAX LEV ALLWD
ENDRIN	39390		0.2 µG/L	2, 4-D	39730		100 µG/L
LINDANE	39782		4 µG/L	2,4, 5-TP SILVEX	39760		10 µG/L
METHOXYCHLOR	39480		100 µG/L	Trichloroethylene		TR<1.0	
TOXAPHENE	39400		5 µG/L	One only		TRACE Present but less than the quantitative limit	
TRIHALOMETHANES (THM)							
CHLOROFORM			TR<1.0				
BROMODICHLOROMETHANE			TR<1.0				
CHLORODIBROMOMETHANE			1.5				
BROMOFORM			2.3				
TOTAL THM			<100				

JUN 13 1980

B. NON-POTABLE WATER ANALYSIS FOR PESTICIDES (Preservation Group H)

PARAMETER	TOTAL	µG/L	PARAMETER	TOTAL	µG/L	PARAMETERS (SPECIFY)	µG/L
ALDRIN	39330		METHOXYCHLOR	39480			
CHLORDANE	39350		TOXAPHENE	39400			
DDT ISOMERS	39370		2,4-D	39730			
DIELDRIN	39380		2,4,5-TP SILVEX	39760			
ENDRIN	39390						
HEPTACHLOR	39410						
HEPTACHLOR EPOXIDE	39420						
LINDANE	39782						

1. ORGANIZATION REQUESTING ANALYSIS
ESD/USAF Clinic/SGPM Stop-24
Hanscom AFB, MA 01731

REMARKS: Single Sample submitted.
Sample maintained at 4°C from collection until packaged in ice for shipment.

CHEMIST: L.P. George

REVIEWED BY: JAMES A. COLLINS, MAJOR USAF, BSC, CHIEF, QUALITY ASSURANCE

APPROVED BY: [signature]

OEHL FORM NOV 78 3 ★ U.S. GOVERNMENT PRINTING OFFICE 1979-679-397 WATER ANALYSIS FOR PESTICIDES

2. LABORATORY PERFORMING ANALYSIS	3. LAB SAMPLE NUMBER	4. REQUESTOR SAMPLE NUMBER
	07723 00008	34800200 00020

SAMPLE COLLECTION INFORMATION

7. SITE DESCRIPTION: H.H.S.T.S. Bldg. 111 WELL No. 2		5. DATE RECEIVED BY LAB: 9 Jul. 80	6. DATE ANALYSIS COMPLETED
8. SITE LOCATION NO: 425802071373201	9. FLOWRATE AT SITE 00058: unk GAL/MIN	10. WEATHER 00041: 5	

ON-SITE ANALYTICAL RESULTS

16. WATER TEMP 00010 °C	17. PH 00400 UNITS	18. DISS O_2 00300 MG/L
12	5.8	unk

11. COLLECTION DATE/PERIOD: 27 June 1980	12. NAME OF COLLECTOR: Tiffany
13. SAMPLING TECHNIQUE: Grab	14. PHONE NUMBER: 86102182
15. REASON FOR SAMPLE SUBMISSION: AF Regulations	

19. RESULTS OF OTHER ON-SITE ANALYSES

ANALYSES REQUESTED AND RESULTS

933

A. PRIMARY DRINKING WATER STANDARDS (40CFR 141)

PRESERVATION GROUP F (214)

PARAMETER	TOTAL	µ G/L	MAX LEV ALLWD
ARSENIC	01002	<10	50 µ G/L
BARIUM	01007	<1000	1000 µ G/L
CADMIUM	01027	<10	10 µ G/L
CHROMIUM	01034	<50	50 µ G/L
LEAD	01051	<20	50 µ G/L
MERCURY	71900	<2	2 µ G/L
SELENIUM	01147	<10	10 µ G/L
SILVER	01077	<10	50 µ G/L

PRESERVATION GROUP C

PARAMETER	TOTAL	MG/L	MAX LEV ALLWD
NITRATE AS N (Cadmium Reduction Method)	00620		10 MG/L

PRESERVATION GROUP G

PARAMETER	TOTAL	MG/L	MAX LEV ALLWD
FLUORIDE	00951		See table in APR 161-44
TURBIDITY	00076	Units	1 Unit
RADIATION			

B. OTHER ANALYSES

PRESERVATION GROUP F

PARAMETER	TOTAL	µG/L
COPPER	01042	<20
IRON	01045	1081
MANGANESE	01055	67
ZINC	01092	63
CALCIUM As Ca	00916	32.9 mg/l
MAGNESIUM as Mg	00927	3.9 mg/l
POTASSIUM	00937	2.4 mg/l
SODIUM	00929	71.9 mg/l

934 PRESERVATION GROUP G (214)

PARAMETER	TOTAL	MG/L
Acidity, Mineral As $CaCO_3$	00436	0
Acidity, Total, As $CaCO_3$	00435	2.7
Alkalin, Phenolth As $CaCO_3$	00415	0
Alkalinity, Total, As $CaCO_3$	00410	19
Chloride	00940	196
Hardness As $CaCO_3$	00900	119
Residue, Filtrable (TDS)	00515	~~[illegible]~~ 602
Residue, Non-Filtrable (SS)	00530	3
Residue	00500	605
Specific Conductance	00095	71(µmhos

PARAMETER	TOTAL	MG/L
Sulfate As SO_4	00945	7
Surfactants MBAS As LAS	38260	<.1

PRESERVATION GROUP J

PARAMETER	TOTAL	

1. ORGANIZATION REQUESTING ANALYSIS

USAF Clinic/SGPM
Hanscom AFB, MA. 01731

CHEMIST

REVIEWED BY
JAMES A. COLLINS
MAJOR USAF, BSC
CHIEF, QUALITY ASSURANCE

APPROVED BY

04-MAY-83 0107Z	SAMPLE ANALYSIS RESULTS
USAF CLINIC HANSCOM/SGPM HANSCOM AFB MA 01731	USAF OCCUPATIONAL AND ENVIRONMENTAL HEALTH LABORATORY(AFSC) BROOKS AFB,TEXAS 78235

IDENTIFICATION	TYPE OF SAMPLE	DATE RECEIVED	OEHL NUMBER
GP830122	DRINKING WATER	18-APR-83	18300492

GROSS ALPHA 2. +/- 1. PICOCURIES PER LITER

ABOVE SAMPLE COMPLIES WITH AFR 161-44
CHECK ANNUAL AVERAGE OF RESULTS FOR THIS SITE TO
DETERMINE COMPLIANCE WITH AFR 161-44

DAVID R. CASE, LT. COL., USAF, BSC CHIEF, RADIOANALYTICAL SERVICES BR. AUTOVON 240-2061	DATE COMPLETED 29-APR-83

04-MAY-83 0107Z	SAMPLE ANALYSIS RESULTS
USAF CLINIC HANSCOM/SGPM HANSCOM AFB MA 01731	USAF OCCUPATIONAL AND ENVIRONMENTAL HEALTH LABORATORY(AFSC) BROOKS AFB,TEXAS 78235

IDENTIFICATION	TYPE OF SAMPLE	DATE RECEIVED	OEHL NUMBER
GP830123	DRINKING WATER	18-APR-83	18300493

GROSS ALPHA <1. PICOCURIES PER LITER

ABOVE SAMPLE COMPLIES WITH AFR 161-44
CHECK ANNUAL AVERAGE OF RESULTS FOR THIS SITE TO
DETERMINE COMPLIANCE WITH AFR 161-44

DAVID R. CASE, LT. COL., USAF, BSC	DATE COMPLETED 29-APR-83

07.12

2. LABORATORY PERFORMING ANALYSIS	3. LAB SAMPLE NUMBER	4. REQUESTOR SAMPLE NUMBER
OEHL	18991-994 00008	6P830121 00028

SAMPLE COLLECTION INFORMATION

7. SITE DESCRIPTION			5. DATE RECEIVED BY LAB	6. DATE ANALYSIS COMPLETED
18 APR 83 08 10			18 April 83	26 April 83

ON-SITE ANALYTICAL RESULTS

8. SITE LOCATION NO	9. FLOWRATE AT SITE 00058 GAL/MIN	10. WEATHER 00041	16. WATER TEMP 000 10 °C	17. PH 00400 UNITS	18. DISS O_2 00300 MG/L
Bldg 148					

11. COLLECTION DATE/PERIOD	12. NAME OF COLLECTOR	19. RESULTS OF OTHER ON-SITE ANALYSES
13. SAMPLING TECHNIQUE	14. PHONE NUMBER	
15. REASON FOR SAMPLE SUBMISSION		

ANALYSES REQUESTED AND RESULTS

A. PRIMARY DRINKING WATER STANDARDS (40CFR 141)

116 PRESERVATION GROUP F 993

PARAMETER	TOTAL	µG/L	MAX LEV ALLWD
ARSENIC	01002	<10	50 µG/L
BARIUM	01007	<200	1000 µG/L
CADMIUM	01027	<10	10 µG/L
CHROMIUM	01034	<50	50 µG/L
LEAD	01051	<20	50 µG/L
MERCURY	71900	<2	2 µG/L
SELENIUM	01147	<10	10 µG/L
SILVER	01077	<10	50 µG/L

PRESERVATION GROUP C 116

PARAMETER	TOTAL	MG/L	MAX LEV ALLWD
NITRATE AS N (Cadmium Reduction Method)	00620	0.7	10 MG/L

PRESERVATION GROUP G 994

PARAMETER	TOTAL	MG/L	MAX LEV ALLWD
FLUORIDE	00951	1.1	See table in AFR 161-44
TURBIDITY	00076	Units	1 Unit
Group C	991		
Ammonia		<.2	
Nitrate		0.7	

~~Hardness~~

B. OTHER ANALYSES

PRESERVATION GROUP F

PARAMETER	TOTAL	µG/L
COPPER	01042	
IRON	01045	862
MANGANESE	01055	122
ZINC	01092	
CALCIUM As Ca	00916	12.4 mg/l
MAGNESIUM as Mg	00927	1.4 mg/l
POTASSIUM	00937	mg/l
SODIUM	00929	8.8 mg/l

PRESERVATION GROUP G 116

PARAMETER	TOTAL	MG/L	PARAMETER	TOTAL	MG/L
Acidity, Mineral As $CaCO_3$	00436		Sulfate As SO_4	00945	
Acidity, Total As $CaCO_3$	00435		Surfactants MBAS As LAS	38260	
Alkalin, Phenolth As $CaCO_3$	00415				
Alkalinity, Total As $CaCO_3$	00410		Group E 992		
Chloride	00940	4	Phenols	<10 ug/l	
Hardness As $CaCO_3$	00900	37			
Residue, Filtrable (TDS)	00515		PRESERVATION GROUP J		
Residue, Non-Filtrable (SS)	00530		PARAMETER		
Residue	00500				
Specific Conductance	00095	µmhos			

1. ORGANIZATION REQUESTING ANALYSIS	CHEMIST 992 LR AK KAH GAL EH DSB
	REVIEWED BY
	APPROVED BY

SSDISCPR

LABORATORY ANALYSIS REPORT AND RECORD (General)

DATE: 13 JUN 1983

TO: ESD / SGPB
Hanscom AFB, MA. 01730

FROM: USAF OEHL/SAN
Brooks AFB TX 78235

SAMPLE IDENTITY: water sample.

DATE RECEIVED: 18 Apr. 83

SAMPLE FROM:

LAB CONTROL NR: See below

TEST FOR: primary drinking water standards for pesticides.

METHODOLOGY
Gas Chromatography

RESULTS

LAB CONTROL NUMBER - BASE CONTROL NUMBER
Concentration in 1 Liter Sample - Micrograms/Liter*

SAMPLE ANALYZED FOR	Quantitative Detection Limit (1 liter sample)	Micrograms/Liter (parts per billion)	18989 GPB30120	18995 GPB30121							
Aldrin	.02		X	X							
DDD	.02		X	X							
DDE	.02		X	X							
Dieldrin	.02		X	X							
Endrin	.02		X	X							
Heptachlor	.02		X	X							
Heptachlorepoxide	.02		X	X							
Lindane	.01		X	X							
p,p'-DDT	.02		X	X							
Diazinon	.02										
Malathion	.10										
Parathion	.02										
Methoxychlor	.20		X	X							
o,p-DDT	.02		X	X							
Chlordane	.20		X	X							
alpha-BHC	.01		X	X							
beta-BHC	.02		X	X							
delta-BHC	.02		X	X							
Toxaphene	1.0		X	X							
2,4-D	0.06		X	X							
Silvex	0.06		X	X							
2,4,5-T	0.06		X	X							

Dennis L. Marks, M.S.

REMARKS
*"T" means less than the quantitative detection limit (Trace present).
*"X" means less than the qualitative detection limit (none detected).

Yoshimi A. Nishioka

YOSHIMI A. NISHIOKA, Chemist

YOSHIMI A. NISHIOKA, GS-12

Dear Mr. McNeil:

1. Please find attached the information you requested from the Hasscom AFB Case File on the drinking water at New Boston Air Force Station.

2. This is all the information we have. If their are any questions please do not hesitate to call this office at 861-2181/2.

Michael P. Vaughn

Michael P. Vaughn, SRA, USAF
Bioenvironmental Engineering

07.12

2. LABORATORY PERFORMING ANAL	3. LAB SAMPLE NUMBER	4. REQUESTOR SAMPLE NO
	69911-14 00008	34800190 00029

SAMPLE COLLECTION INFORMATION

7. SITE DESCRIPTION: N.H.S.Y.S. Bldg. 100 Worthington cooling towers

5. DATE RECEIVED BY LAB: 9 July 80

6. DATE ANALYSIS COMPLETED: 4 Aug. 80

8. SITE LOCATION NO	9. FLOWRATE AT SITE 00058 GAL/MIN.	10. WEATHER 00041
425648071374302	unk	5

ON-SITE ANALYTICAL RESULTS

16. WATER TEMP 00010 °C	17. PH 00400 UNITS	18. DISS O_2 00300 MG/L
25	7.6	unk

11. COLLECTION DATE/PERIOD	12. COLLECTOR'S NAME
27 June 1980	Tiffany

13. SAMPLING TECHNIQUE	14. PHONE NUMBER
Grab	861-2182

15. REASON FOR SAMPLE SUBMISSION
NPDES # AF Regulations

19. RESULTS OF OTHER ON-SITE ANALYSES
JUL 9 10 23 AM '80
XX REC'D

ANALYSES REQUESTED AND RESULTS

911 PRESERVATION GROUP A (193)

PARAMETER	TOTAL	MG/L
Chemical Oxygen Demand	340	25.
Total Organic CARBON as C	00680	7.
		.

PRESERVATION GROUP B

PARAMETER	TOTAL	MG/L
OIL & GREASE FREON-IR Method	00560	.

912 PRESERVATION GROUP C (196)

PARAMETER	TOTAL	MG/L
AMMONIA as N	00610	.
NITRATE as N Cd Reduct. Method	00620	.
NITRITE as N	00615	<.02
TOTAL KJELDAHL NITROGEN as N	00625	.
PHOSPHORUS Ortho PO_4 as P	70507	0.5
PHOSPHORUS as P	00665	2.4

PRESERVATION GROUP D

PARAMETER	TOTAL	MG/L
CYANIDE	00720	.
CYANIDE Free, Amenable to Cl_2	00722	.

PRESERVATION GROUP E

PARAMETER	TOTAL	µG/L
PHENOLS	32730	.
		.

913 PRESERVATION GROUP F (214)

PARAMETER	DISS	TOTAL	µG/L
ARSENIC	01000	01002	<10.
BARIUM	01005	01007	<1000.
CADMIUM	01025	01027	<10.
CHROMIUM	01030	01034	400.
CHROMIUM Hexavalent		01032	<50.
COPPER	01040	01042	53.
IRON	01046	01045	2361.
LEAD	01049	01051	<50.
MANGANESE	01056	01055	100.
MERCURY	71890	71900	<5.
NICKEL	01065	01067	<50.
SELENIUM	01145	01147	<10.
SILVER	01075	01077	<10.
ZINC	01090	01092	690.
CALCIUM as Ca	00915	00916	105.2 mg/l
MAGNESIUM as Mg	00925	00927	24.3 mg/l
POTASSIUM	00935	00937	1.1 mg/l
SODIUM	00930	00929	233.6 mg/l

914 PRESERVATION GROUP G (196)

PARAMETER	TOTAL	MG/L
BORON	01022	<500. µg/l
BORON, Dissolved	01020	<500. µg/l
CHLORIDE	00940	500.
COLOR	00080	25 Units
FLUORIDE	00951	0.3
Residue Filterable (TDS)	00515	1661.
Residue Non Filt (SS)	00530	9.
Residue	00500	1610.
Residue Volatile	00505	233.
Specific Conductance	00095	1800 µmhos
SULFATE as SO_4	00945	25.
SURFACTANTS MBAS as LAS	38260	0.2
TURBIDITY	00076	4 Units

PRESERVATION GROUP J

PARAMETER		

1. ORGANIZATION REQUESTING ANALYSIS

USAF Clinic/SGPM
Hanscom AFB, MA. 01731

File with NHSYS NPDES PERMIT
EFM 20 Aug 80

CHEMIST: BAR DRT.

REVIEWED BY
JAMES A. COLLINS
MAJOR USAF. BSC
~~CHIEF, QUALITY ASSURANCE~~

OEHL FORM NOV 76 1

NON-POTABLE WATER ANALYSIS

07.12

2. LABORATORY PERFORMING ANALYSIS	3. LAB SAMPLE NUMBER	4. REQUESTOR SAMPLE NO
	69911-14 00008	34800190 00029

SAMPLE COLLECTION INFORMATION

7. SITE DESCRIPTION: Bldg. 100 Worthington cooling towers

5. DATE RECEIVED BY LAB	6. DATE ANALYSIS COMPLETED
9 July 80	4 Aug. 80

8. SITE LOCATION NO	9. FLOWRATE AT SITE 00058 GAL/MIN	10. WEATHER 00041
125642071374302	unk	5

11. COLLECTION DATE/PERIOD	12. COLLECTOR'S NAME
27 June 1980	Tiffany

13. SAMPLING TECHNIQUE	14. PHONE NUMBER
Grab	861-2182

15. REASON FOR SAMPLE SUBMISSION

NPDES # AF Regulations

ON-SITE ANALYTICAL RESULTS

16. WATER TEMP 00010 °C	17. PH 00400 UNITS	18. DISS O2 00300 MG/L
25	7.5	

19. RESULTS OF OTHER ON-SITE ANALYSES

ANALYSES REQUESTED AND RESULTS

911 PRESERVATION GROUP A (193)

PARAMETER	TOTAL	MG/L
Chemical Oxygen Demand	00340	25.
Total Organic CARBON as C	00680	7.

PRESERVATION GROUP B

PARAMETER	TOTAL	MG/L
OIL & GREASE FREON-IR Method	00560	.

912 PRESERVATION GROUP C

PARAMETER	TOTAL	MG/L
AMMONIA as N	00610	.
NITRATE as N Cd Reduct. Method	00620	.
NITRITE as N	00615	< .02
TOTAL KJELDAHL NITROGEN as N	00625	.
PHOSPHORUS Ortho PO4 as P	70507	0.5
PHOSPHORUS as P	00665	2.4

PRESERVATION GROUP D

PARAMETER	TOTAL	MG/L
CYANIDE	00720	.
CYANIDE Free, Amenable to Cl_2	00722	.

PRESERVATION GROUP E

PARAMETER	TOTAL	µG/L
PHENOLS	32730	.

913 PRESERVATION GROUP F

PARAMETER	DISS	TOTAL	µG/L
ARSENIC	01000	01002	<10.
BARIUM	01005	01007	<1000.
CADMIUM	01025	01027	<10.
CHROMIUM	01030	01034	400.
CHROMIUM Hexavalent		01032	<50.
COPPER	01040	01042	53.
IRON	01046	01045	2361.
LEAD	01049	01051	<50.
MANGANESE	01056	01055	100.
MERCURY	71890	71900	<5.
NICKEL	01065	01067	<50.
SELENIUM	01145	01147	<10.
SILVER	01075	01077	<10.
ZINC	01090	01092	690.
CALCIUM as Ca	00915	00916	105.2 mg/l
MAGNESIUM as Mg	00925	00927	24.3 mg/l
POTASSIUM	00935	00937	11 mg/l
SODIUM	00930	00929	233.6 mg/l

914 PRESERVATION GROUP G (194)

PARAMETER	TOTAL	MG/L
BORON	01022	<500. µg/l
BORON, Dissolved	01020	<500. µg/l
CHLORIDE	00940	500.
COLOR	00080	25 Units
FLUORIDE	00951	0.3
Residue Filterable (TDS)	00515	~~1539~~ 1551.
Residue Non Filt (SS)	00530	9.
Residue	00500	1610.
Residue Volatile	00505	233.
Specific Conductance	00095	1500 µmhos
SULFATE as SO_4	00945	25.
SURFACTANTS MBAS as LAS	38260	0.2
TURBIDITY	00076	4 Units

PRESERVATION GROUP J

PARAMETER		

1. ORGANIZATION REQUESTING ANALYSIS

USAF Clinic, [illegible]

[illegible]

4218

CHEMIST: MAR [illegible]

REVIEWED BY: [illegible] GSO

APPROVED BY: [illegible] QUALITY ASSURANCE

OEHL FORM NOV 76 1

NON-POTABLE WATER ANALYSIS

Chemserve
Powers Street
Milford, New Hampshire 03055
Area Code 603 673-5440

LABORATORY #7464

RECEIVED
MAR 15 1983
DET 2, AFSCF/DE

All analyses performed in accordance with the requirements of the U.S.E.P.A.

Certified by: [signature]

DET 2, AFSCF/DE
NEW BOSTON AIR FORCE STATION
NEW HAMPSHIRE 03108
PERMIT #

DATE SAMPLED 2/3/83
DATE RECEIVED 2/3/83
DATE COMPLETED 3/9/83
SAMPLER

ALL RESULTS ARE IN (MG/L) EXCEPT AS NOTED

SAMPLE IDENTITY		TEST PARAMETER	RESULTS
GRAB #1	1250	PH (UNITS)	6.88
	1405	TEMPERATURE	40 F
	1415	TIME	0800
GRAB #2	1250	PH (UNITS)	6.90
	1405	TEMPERATURE	40 F
	1415	TIME	0900
3 GRAB #3	1250	PH (UNITS)	6.94
	1405	TEMPERATURE	39 F
	1415	TIME	1000
GRAB #4	1250	PH (UNITS)	6.67
	1405	TEMPERATURE	75 F
	1415	TIME	1100
GRAB #5	1250	PH (UNITS)	7.02
	1405	TEMPERATURE	47 F
	1415	TIME	1200
GRAB #6	1250	PH (UNITS)	7.12
	1405	TEMPERATURE	78 F
	1415	TIME	1300
GRAB #7	1250	PH (UNITS)	6.88
	1405	TEMPERATURE	83 F
	1415	TIME	1400
GRAB #8	1250	PH (UNITS)	7.02
	1405	TEMPERATURE	85 F
	1415	TIME	1500
COMPOSITE	1020	BOD 5-DAY	4
	1060	C.O.D.	<3.0
	1170	N-AMMONIA	0.188

CHEMSERVE INCORPORATED
POWERS STREET
MILFORD NEW HAMPSHIRE 03055
603-673-5440

DET 2, AFSCF/DE
NBAFS
New Hampshire
03108

Laboratory # 8484
Date Sampled 11/21/84
Date Received 11/21/84
Date Complete 11/28/84

ID # 2410 Sampler: Robert Hertzog

All analyses performed in accordance with U.S.E.P.A. methods.

Certified by : ...

All results are in (mg/l) except as noted.

SAMPLE IDENTITY	TEST PARAMETER	RESULTS
Well #1	Sodium	56.9
	Chlorides	189
Well #2	Sodium	102.82
	Chlorides	233
Well #3	Sodium	13.48
	Chlorides	24

**************** END *****************

CHEMSERVE INCORPORATED
POWERS STREET
MILFORD NEW HAMPSHIRE 03055
603-673-5440

RECEIVED
MAR 7 1984
DET 2, AFSCF/DE

DET 2, AFSCF/DE
NBAFS
New Hampshire
03102

Laboratory # 8086
Date Sampled 2/28/84
Date Received 2/28/84
Date Complete 3/3/84

ID # 2410 Sampler: Robert Hertzog

All analyses performed in accordance with U.S. E.P.A. methods.

Certified by : ....

All results are in (mg/l) except as noted.

SAMPLE IDENTITY	TEST PARAMETER	RESULTS
Well #1	Sodium	55
	Chloride	154
Well #2	Sodium	72
	Chloride	200
Well #3	Sodium	8.0
	Chloride	6.0

************* END *************

DE- WATER
QUALITY
14A
DAW

08 November 1977

MEMO FOR RECORD

SUBJECT: Ground Well Water Sample Test Data

Water samples taken by Sam Crawford, FACC, 03 October 1977, have been analyzed as follows:

Well	Dissolve Solids mg/liter	PH	Resistivity ohm cm
1	274	6.25	1.8×10^3
2	336	6.15	1.4×10^3
3	125	5.90	5.9×10^3
SEGP	386	6.35	1.2×10^3
HT (SAT Com)	230	7.0	2.3×10^3
200' Tank	22	5.35	2.6×10^4
400' Tank	400	5.70	1.0×10^3

Paul E. Moore, SICR, NHS

cc: DE
CCM

RECEIVED

NOV 8 1977

BCE

2. LABORATORY PERFORMING ANALYSIS	3. LAB SAMPLE NUMBER	4. REQUESTOR SAMPLE NUMBER
	07722 00008	34800200 00028

SAMPLE COLLECTION INFORMATION

7. SITE DESCRIPTION: N.H.S.T.S. Bldg. 111		5. DATE RECEIVED BY LAB: 9 Jul 80	6. DATE ANALYSIS COMPLETED: [illegible]
8. SITE LOCATION NO: 425802071373201	9. FLOWRATE AT SITE 00058 GAL/MIN: unk	10. WEATHER 00041: 5	
11. COLLECTION DATE/PERIOD: 27 June 1980	12. NAME OF COLLECTOR: Tiffany		
13. SAMPLING TECHNIQUE: Grab	14. PHONE NUMBER: 86102182		
15. REASON FOR SAMPLE SUBMISSION: AF Regulations			

ON-SITE ANALYTICAL RESULTS

16. WATER TEMP 000 10 °C	17. PH 00400 UNITS	18. DISS O_2 00300 MG/L
12	5.8	unk

19. RESULTS OF OTHER ON-SITE ANALYSES

ANALYSES REQUESTED AND RESULTS

933

A. PRIMARY DRINKING WATER STANDARDS (40CFR 141)

PRESERVATION GROUP F (219)

PARAMETER	TOTAL	µG/L	MAX LEV ALLWD
ARSENIC	01002	<10.	50 µG/L
BARIUM	01007	<1000.	1000 µG/L
CADMIUM	01027	<10.	10. µG/L
CHROMIUM	01034	<50.	50 µG/L
LEAD	01051	<20.	50 µG/L
MERCURY	71900	<2.	2 µG/L
SELENIUM	01147	<10.	10 µG/L
SILVER	01077	<10.	50 µG/L

PRESERVATION GROUP C

PARAMETER	TOTAL	MG/L	MAX LEV ALLWD
NITRATE AS N (Cadmium Reduction Method)	00620		10 MG/L

PRESERVATION GROUP G

PARAMETER	TOTAL	MG/L	MAX LEV ALLWD
FLUORIDE	00951	.	See table in AFR 161-44
TURBIDITY	00076	Units	1 Unit
RADIATION			

B. OTHER ANALYSES

PRESERVATION GROUP F

PARAMETER	TOTAL	µG/L
COPPER	01042	<20.
IRON	01045	1081.
MANGANESE	01055	67.
ZINC	01092	63.
CALCIUM As Ca	00916	32.9 mg/l
MAGNESIUM as Mg	00927	3.9 mg/l
POTASSIUM	00937	2.4 mg/l
SODIUM	00929	71.9 mg/l

934 PRESERVATION GROUP G (211)

PARAMETER	TOTAL	MG/L
Acidity, Mineral As $CaCO_3$	00436	0.
Acidity, Total, As $CaCO_3$	00435	2.7
Alkalin, Phenolth As $CaCO_3$	00415	0.
Alkalinity, Total, As $CaCO_3$	00410	19.
Chloride	00940	196.
Hardness As $CaCO_3$	00900	119.
Residue, Filtrable (TDS)	00515	602
Residue, Non-Filtrable (SS)	00530	3.
Residue	00500	605.
Specific Conductance	00095	760 µmhos

PARAMETER	TOTAL	MG/L
Sulfate As SO_4	00945	7.
Surfactants MBAS As LAS	38260	<.1

PRESERVATION GROUP J

PARAMETER		

1. ORGANIZATION REQUESTING ANALYSIS

USAF Clinic/SGPM
Hanscom AFB, MA. 01731

CHEMIST: [illegible signature]

REVIEWED BY: JAMES A. COLLINS, MAJOR USAF, BSC, CHIEF, QUALITY ASSURANCE

APPROVED BY: [illegible signature]

OEHL FORM NOV 76 2 ☆ U.S. GOVERNMENT PRINTING OFFICE 1979-672-398 **POTABLE WATER ANALYSIS**

2. LABORATORY PERFORMING ANALYSIS	3. LAB SAMPLE NUMBER	4. REQUESTOR SAMPLE NUMBER
	69931-32 00008	34800199 00029

SAMPLE COLLECTION INFORMATION

5. DATE RECEIVED BY LAB	9 Jul 80
6. DATE ANALYSIS COMPLETED	8 Aug 80
7. SITE DESCRIPTION	N.H.S.T.S. Bldg. 120
8. SITE LOCATION NO	4256400713745
9. FLOWRATE AT SITE 00058 GAL/MIN	unk
10. WEATHER 00041	5
11. COLLECTION DATE/PERIOD	27 June 1980
12. NAME OF COLLECTOR	TIFFANY
13. SAMPLING TECHNIQUE	Grab
14. PHONE NUMBER	AV 478-2182
15. REASON FOR SAMPLE SUBMISSION	AF Regulations

ON-SITE ANALYTICAL RESULTS

16. WATER TEMP 000 10 °C	17. PH 00400 UNITS	18. DISS O_2 00300 MG/L
15	6.4	unk

19. RESULTS OF OTHER ON-SITE ANALYSES

ANALYSES REQUESTED AND RESULTS

A. PRIMARY DRINKING WATER STANDARDS (40CFR 141)

931

PRESERVATION GROUP F (214)

PARAMETER	TOTAL	µG/L	MAX LEV ALLWD
ARSENIC	01002	<10	50 µG/L
BARIUM	01007	<1000	1000 µG/L
CADMIUM	01027	<10	10. µG/L
CHROMIUM	01034	<50	50 µG/L
LEAD	01051	<20	50 µG/L
MERCURY	71900	<2	2 µG/L
SELENIUM	01147	<10	10 µG/L
SILVER	01077	<10	50 µG/L

PRESERVATION GROUP C

PARAMETER	TOTAL	MG/L	MAX LEV ALLWD
NITRATE AS N (Cadmium Reduction Method)	00620		10 MG/L

PRESERVATION GROUP G

PARAMETER	TOTAL	MG/L	MAX LEV ALLWD
FLUORIDE	00951		See table in AFR 161-44
TURBIDITY	00076	Units	1 Unit

B. OTHER ANALYSES

PRESERVATION GROUP F

PARAMETER	TOTAL	µG/L
COPPER	01042	299
IRON	01045	333
MANGANESE	01055	<50
ZINC	01092	<50
CALCIUM As Ca	00916	36.1 mg/l
MAGNESIUM as Mg	00927	7.9 mg/l
POTASSIUM	00937	2.7 mg/l
SODIUM	00929	104.5 mg/l

932

PRESERVATION GROUP G (215)

PARAMETER	TOTAL	MG/L
Acidity, Mineral As $CaCO_3$	00436	0
Acidity, Total, As $CaCO_3$	00435	4.5
Alkalin, Phenolth As $CaCO_3$	00415	0
Alkalinity, Total, As $CaCO_3$	00410	32
Chloride	00940	180
Hardness As $CaCO_3$	00900	122
Residue, Filtrable (TDS)	00515	539
Residue, Non-Filtrable (SS)	00530	<1
Residue	00500	~~530~~ 534
Specific Conductance	00095	680 µmhos
Sulfate As SO_4	00945	7
Surfactants MBAS As LAS	38260	<1

PRESERVATION GROUP J

PARAMETER		

1. ORGANIZATION REQUESTING ANALYSIS

USAF Clinic/SGPN
Hanscom AFB, MA. 01731

CHEMIST [illegible signature]

REVIEWED BY [illegible signature]

APPROVED BY [illegible signature]

OEHL FORM NOV 76 2 ☆ U.S. GOVERNMENT PRINTING OFFICE 1979-672 398 POTABLE WATER ANALYSIS

LABORATORY PERFORMING ANALYSIS	3. LAB SAMPLE NUMBER	4. REQUESTOR SAMPLE NUMBER
C	69929-30 00008	34800198 00027

SAMPLE COLLECTION INFORMATION

7. SITE DESCRIPTION: NHSTS Bldg. 141		5. DATE RECEIVED BY LAB: 9 Jul 80	6. DATE ANALYSIS COMPLETED: 8 Aug 80
8. SITE LOCATION NO: 4256510713747	9. FLOWRATE AT SITE (00058 GAL/MIN): unk	10. WEATHER (00041): 5	ON-SITE ANALYTICAL RESULTS: 16. WATER TEMP (000 10 °C): 24; 17. PH (00400 UNITS): 6.4; 18. DISS O_2 (00300 MG/L): unk
11. COLLECTION DATE/PERIOD: 27 June 1980		12. NAME OF COLLECTOR: TIFFANY	19. RESULTS OF OTHER ON-SITE ANALYSES
13. SAMPLING TECHNIQUE: Grab		14. PHONE NUMBER: AV 478-2182	
15. REASON FOR SAMPLE SUBMISSION: AF Regulations			

ANALYSES REQUESTED AND RESULTS

A. PRIMARY DRINKING WATER STANDARDS (40CFR 141)

929

PRESERVATION GROUP F (221)

PARAMETER	TOTAL	µG/L	MAX LEV ALLWD
ARSENIC	01002	<10	50 µG/L
BARIUM	01007	<1000	1000 µG/L
CADMIUM	01027	<10	10. µG/L
CHROMIUM	01034	<50	50 µG/L
LEAD	01051	<20	50 µG/L
MERCURY	71900	<2	2 µG/L
SELENIUM	01147	<10	10 µG/L
SILVER	01077	<10	50 µG/L

PRESERVATION GROUP C

PARAMETER	TOTAL	MG/L	MAX LEV ALLWD
NITRATE AS N (Cadmium Reduction Method)	00620		10 MG/L

PRESERVATION GROUP G

PARAMETER	TOTAL	MG/L	MAX LEV ALLWD
FLUORIDE	00951		See table in AFR 161-44
TURBIDITY	00076	Units	1 Unit

B. OTHER ANALYSES

PRESERVATION GROUP F

PARAMETER	TOTAL	µG/L
COPPER	01042	1226
IRON	01045	353
MANGANESE	01055	54
ZINC	01092	56
CALCIUM As Ca	00916	59.9 mg/l
MAGNESIUM as Mg	00927	21 mg/l
POTASSIUM	00937	3.3 mg/l
SODIUM	00929	111.8 mg/l

930

PRESERVATION GROUP G (214)

PARAMETER	TOTAL	MG/L
Acidity, Mineral As $CaCO_3$	00436	0
Acidity, Total, As $CaCO_3$	00435	2.7
Alkalin, Phenolth As $CaCO_3$	00415	0
Alkalinity, Total, As $CaCO_3$	00410	45
Chloride	00940	180
Hardness As $CaCO_3$	00900	153
Residue, Filtrable (TDS)	00515	556
Residue, Non-Filtrable (SS)	00530	2
Residue	00500	558
Specific Conductance	00095	700 µmhos

PARAMETER	TOTAL	MG/L
Sulfate As SO_4	00945	6
Surfactants MBAS As LAS	38260	<1

PRESERVATION GROUP J

PARAMETER		

1. ORGANIZATION REQUESTING ANALYSIS

USAF Clinic/SGPM
Hanscom AFB, MA. 07131

CHEMIST: [illegible]

REVIEWED BY: MAJOR ... CHIEF, ...

APPROVED BY: [signature]

OEHL FORM NOV 76 2 ☆ U.S. GOVERNMENT PRINTING OFFICE 1979-672 398 POTABLE WATER ANALYSIS

1. LABORATORY PERFORMING ANALYSIS	3. LAB SAMPLE NUMBER	4. REQUESTOR SAMPLE NUMBER
	69927-28 00008	34800197 00028

SAMPLE COLLECTION INFORMATION

7. SITE DESCRIPTION		5. DATE RECEIVED BY LAB	6. DATE ANALYSIS COMPLETED
N.H.S.T.S. Bldg. 108		9 Jul 80	8 Aug 80

ON-SITE ANALYTICAL RESULTS

8. SITE LOCATION NO	9. FLOWRATE AT SITE 00059 GAL/MIN	10. WEATHER 00041	16. WATER TEMP 000 10 °C	17. PH 00400 UNITS	18. DISS O_2 00300 MG/L
4256420713750	unk	5	17	6.0	unk

11. COLLECTION DATE/PERIOD	12. NAME OF COLLECTOR	19. RESULTS OF OTHER ON-SITE ANALYSES
27 June 1980	TIFFANY	
13. SAMPLING TECHNIQUE	**14. PHONE NUMBER**	
Grab	AV 478-2182	
15. REASON FOR SAMPLE SUBMISSION		
AF Regulations		

ANALYSES REQUESTED AND RESULTS

A. PRIMARY DRINKING WATER STANDARDS (40CFR 141)

927 PRESERVATION GROUP F (221)

PARAMETER	TOTAL	µ G/L	MAX LEV ALLWD
ARSENIC	01002	<10.	50 µ G/L
BARIUM	01007	<1000.	1000 µ G/L
CADMIUM	01027	<10.	10. µ G/L
CHROMIUM	01034	<50.	50 µ G/L
LEAD	01051	<20.	50 µ G/L
MERCURY	71900	<2.	2 µ G/L
SELENIUM	01147	<10.	10 µ G/L
SILVER	01077	<10.	50 µ G/L

PRESERVATION GROUP C

PARAMETER	TOTAL	MG/L	MAX LEV ALLWD
NITRATE AS N (Cadmium Reduction Method)	00620		10 MG/L

PRESERVATION GROUP G

PARAMETER	TOTAL	MG/L	MAX LEV ALLWD
FLUORIDE	00951		See table in AFR 161-44
TURBIDITY	00076	Units	1 Unit

B. OTHER ANALYSES

PRESERVATION GROUP F

PARAMETER	TOTAL	µG/L
COPPER	01042	140.
IRON	01045	755.
MANGANESE	01055	<50.
ZINC	01092	<50.
CALCIUM As Ca	00916	34.7 mg/l
MAGNESIUM as Mg	00927	3.0 mg/l
POTASSIUM	00937	2.7 mg/l
SODIUM	00929	101.7 mg/l

925 PRESERVATION GROUP G (219)

PARAMETER	TOTAL	MG/L
Acidity, Mineral As $CaCO_3$	00436	0.
Acidity, Total, As $CaCO_3$	00435	3.1
Alkalin, Phenolth As $CaCO_3$	00415	0.
Alkalinity, Total, As $CaCO_3$	00410	28.
Chloride	00940	110.
Hardness As $CaCO_3$	00900	120.
Residue, Filtrable (TDS)	70515	533.
Residue, Non-Filtrable (SS)	00530	<1.
Residue	00500	~~353~~ 533
Specific Conductance	00095	660 µmhos

PARAMETER	TOTAL	MG/L
Sulfate As SO_4	00945	7.
Surfactants MBAS As LAS	38260	<1.

PRESERVATION GROUP J

PARAMETER		

1. ORGANIZATION REQUESTING ANALYSIS	CHEMIST
USAF Clinic/SGPM Hanscom AFB, MA. 01731	
	REVIEWED BY JAMES A. COLLINS MAJOR USAF BSC CHIEF, QUALITY ASSURANCE
	APPROVED BY

OEHL FORM NOV 76 2   U.S. GOVERNMENT PRINTING OFFICE 1979-672-398   POTABLE WATER ANALYSIS

2. LABORATORY PERFORMING ANALYSIS	3. LAB SAMPLE NUMBER	4. REQUESTOR SAMPLE NUMBER
	69925·26 00008	34800196 00029

SAMPLE COLLECTION INFORMATION

7. SITE DESCRIPTION			5. DATE RECEIVED BY LAB	6. DATE ANALYSIS COMPLETED
N.H.S.T.S. Bldg. 100			9 Jul 80	8 Aug 80

ON-SITE ANALYTICAL RESULTS

8. SITE LOCATION NO	9. FLOWRATE AT SITE 00058 GAL/MIN	10. WEATHER 00041	16. WATER TEMP 000 10 °C	17. PH 00400 UNITS	18. DISS O_2 00300 MG/L
425809071374101	unk	5	25	5.8	unk

11. COLLECTION DATE/PERIOD	12. NAME OF COLLECTOR
27 June 1980	TIFFANY
13. SAMPLING TECHNIQUE	14. PHONE NUMBER
Grab	AV 478-2182
15. REASON FOR SAMPLE SUBMISSION	
AF Regulations	

19. RESULTS OF OTHER ON-SITE ANALYSES

ANALYSES REQUESTED AND RESULTS

A. PRIMARY DRINKING WATER STANDARDS (40CFR 141)

925

PRESERVATION GROUP F (219)

PARAMETER	TOTAL	µG/L	MAX LEV ALLWD
ARSENIC	01002	<10	50 µG/L
BARIUM	01007	<1000	1000 µG/L
CADMIUM	01027	<10	10 µG/L
CHROMIUM	01034	<50	50 µG/L
LEAD	01051	77	50 µG/L
MERCURY	71900	<2	2 µG/L
SELENIUM	01147	<10	10 µG/L
SILVER	01077	<10	50 µG/L

PRESERVATION GROUP C

PARAMETER	TOTAL	MG/L	MAX LEV ALLWD
NITRATE AS N (Cadmium Reduction Method)	00620		10 MG/L

PRESERVATION GROUP G

PARAMETER	TOTAL	MG/L	MAX LEV ALLWD
FLUORIDE	00951		See table in AFR 161-44
TURBIDITY	00076	Units	1 Unit

B. OTHER ANALYSES

PRESERVATION GROUP F

PARAMETER	TOTAL	µG/L
COPPER	01042	2651
IRON	01045	398
MANGANESE	01055	<50
ZINC	01092	190
CALCIUM As Ca	00916	34.1 mg/l
MAGNESIUM as Mg	00927	7.9 mg/l
POTASSIUM	00937	2.8 mg/l
SODIUM	00929	76.5 mg/l

926

PRESERVATION GROUP G (219)

PARAMETER	TOTAL	MG/L
Acidity, Mineral As $CaCO_3$	00436	0
Acidity, Total, As $CaCO_3$	00435	3.6
Alkalin, Phenolth As $CaCO_3$	00415	0
Alkalinity, Total, As $CaCO_3$	00410	28
Chloride	00940	130
Hardness As $CaCO_3$	00900	117
Residue, Filtrable (TDS)	00515	582
Residue, Non-Filtrable (SS)	00530	<1
Residue	00500	~~582~~ 582
Specific Conductance	00095	680 µmhos

PARAMETER	TOTAL	MG/L
Sulfate As SO_4	00945	7
Surfactants MBAS As LAS	38260	<1

PRESERVATION GROUP J

PARAMETER		

1. ORGANIZATION REQUESTING ANALYSIS

USAF Clinic/SGPM
Hanscom AFB, MA. 01731

CHEMIST [signature]

REVIEWED BY [signature]

APPROVED BY [signature]

OEHL FORM NOV 76 2 — U.S. GOVERNMENT PRINTING OFFICE 1979-672 398 — POTABLE WATER ANALYSIS

LABORATORY PERFORMING ANALYSIS	3. LAB SAMPLE NUMBER	4. REQUESTOR SAMPLE NUMBER
	69923-24 00008	34800195 00028

SAMPLE COLLECTION INFORMATION

7. SITE DESCRIPTION			5. DATE RECEIVED BY LAB	6. DATE ANALYSIS COMPLETED
N.H.S.T.S. Bldg. 103			9 Jul 80	8 Aug 80

ON-SITE ANALYTICAL RESULTS

8. SITE LOCATION NO	9. FLOWRATE AT SITE 00058 GAL/MIN	10. WEATHER 00041	16. WATER TEMP 00010 °C	17. PH 00400 UNITS	18. DISS O_2 00300 MG/L
4256520713723	unk	5	17	6.2	unk

11. COLLECTION DATE/PERIOD	12. NAME OF COLLECTOR	19. RESULTS OF OTHER ON-SITE ANALYSES
27 June 1980	Tiffany	
13. SAMPLING TECHNIQUE	**14. PHONE NUMBER**	
Grab	861-2182	
15. REASON FOR SAMPLE SUBMISSION		
AF Regulations		

ANALYSES REQUESTED AND RESULTS

923

A. PRIMARY DRINKING WATER STANDARDS (40CFR 141)

PRESERVATION GROUP F (2 L)

PARAMETER	TOTAL	µG/L	MAX LEV ALLWD
ARSENIC	01002	<10	50 µG/L
BARIUM	01007	<1000	1000 µG/L
CADMIUM	01027	<10	10. µG/L
CHROMIUM	01034	<50	50 µG/L
LEAD	01051	53	50 µG/L
MERCURY	71900	<2	2 µG/L
SELENIUM	01147	<10	10 µG/L
SILVER	01077	<10	50 µG/L

PRESERVATION GROUP C

PARAMETER	TOTAL	MG/L	MAX LEV ALLWD
NITRATE AS N (Cadmium Reduction Method)	00620		10 MG/L

PRESERVATION GROUP G

PARAMETER	TOTAL	MG/L	MAX LEV ALLWD
FLUORIDE	00951		See table in AFR 161-44
TURBIDITY	00076	Units	1 Unit

B. OTHER ANALYSES

924

PRESERVATION GROUP F

PARAMETER	TOTAL	µG/L
COPPER	01042	74
IRON	01045	815
MANGANESE	01055	68
ZINC	01092	490
CALCIUM As Ca	00916	35.4 mg/l
MAGNESIUM as Mg	00927	8.0 mg/l
POTASSIUM	00937	3.0 mg/l
SODIUM	00929	69.4 mg/l

PRESERVATION GROUP G (2 L)

PARAMETER	TOTAL	MG/L
Acidity, Mineral As $CaCO_3$	00436	0
Acidity, Total, As $CaCO_3$	00435	3.1
Alkalin, Phenolth As $CaCO_3$	00415	0
Alkalinity, Total, As $CaCO_3$	00410	28
Chloride	00940	176.
Hardness As $CaCO_3$	00900	121
Residue, Filtrable (TDS)	00515	559.
Residue, Non-Filtrable (SS)	00530	<1
Residue	00500	~~581~~ 559
Specific Conductance	00095	670 µmhos

PARAMETER	TOTAL	MG/L
Sulfate As SO_4	00945	7.
Surfactants MBAS As LAS	38260	<1.

PRESERVATION GROUP J

PARAMETER		

1. ORGANIZATION REQUESTING ANALYSIS	CHEMIST
USAF Clinic/SGPM Hanscom AFB ,MA. 01731	[signature]
	REVIEWED BY JAMES A. COLLINS MAJOR USAF, BSC CHIEF, QUALITY ASSURANCE
	APPROVED BY [signature]

OEHL FORM NOV 76 2 ☆ U.S. GOVERNMENT PRINTING OFFICE 1979-672-398 POTABLE WATER ANALYSIS

LABORATORY PERFORMING ANALYSIS	3. LAB SAMPLE NUMBER	4. REQUESTOR SAMPLE NUMBER
	69921-22 00006	34800194 00029

SAMPLE COLLECTION INFORMATION

7. SITE DESCRIPTION	N.H.S.T.S. Bldg. 106
8. SITE LOCATION NO	4256520713740
9. FLOWRATE AT SITE 00058 GAL/MIN	unk
10. WEATHER 00041	5
11. COLLECTION DATE/PERIOD	27 June 1980
12. NAME OF COLLECTOR	Tiffany
13. SAMPLING TECHNIQUE	Grab
14. PHONE NUMBER	861-2182
15. REASON FOR SAMPLE SUBMISSION	AF Regulations
5. DATE RECEIVED BY LAB	9 July 80
6. DATE ANALYSIS COMPLETED	8 Aug 80

ON-SITE ANALYTICAL RESULTS

16. WATER TEMP 00010 °C	17. PH 00400 UNITS	18. DISS O_2 00300 MG/L
17	6.4	unk

19. RESULTS OF OTHER ON-SITE ANALYSES

ANALYSES REQUESTED AND RESULTS

A. PRIMARY DRINKING WATER STANDARDS (40CFR 141)

921 PRESERVATION GROUP F (219)

PARAMETER	TOTAL	µG/L	MAX LEV ALLWD
ARSENIC	01002	<10.	50 µG/L
BARIUM	01007	<1000.	1000 µG/L
CADMIUM	01027	<10.	10. µG/L
CHROMIUM	01034	<50.	50 µG/L
LEAD	01051	<20.	50 µG/L
MERCURY	71900	<2.	2 µG/L
SELENIUM	01147	<10.	10 µG/L
SILVER	01077	<17.	50 µG/L

PRESERVATION GROUP C

PARAMETER	TOTAL	MG/L	MAX LEV ALLWD
NITRATE AS N (Cadmium Reduction Method)	00620		10 MG/L

PRESERVATION GROUP G

PARAMETER	TOTAL	MG/L	MAX LEV ALLWD
FLUORIDE	00951	.	See table in AFR 161-44
TURBIDITY	00076	Units	1 Unit

B. OTHER ANALYSES (218)

PRESERVATION GROUP F

PARAMETER	TOTAL	µG/L
COPPER	01042	40.
IRON	01045	273.
MANGANESE	01055	<50.
ZINC	01092	100.
CALCIUM As Ca	00916	44 mg/l
MAGNESIUM as Mg	00927	7.1 mg/l
POTASSIUM	00937	3.3 mg/l
SODIUM	00929	43 mg/l

922 PRESERVATION GROUP G

PARAMETER	TOTAL	MG/L
Acidity, Mineral As $CaCO_3$	00436	0.
Acidity, Total, As $CaCO_3$	00435	2.7
Alkalin, Phenolth As $CaCO_3$	00415	0.
Alkalinity, Total, As $CaCO_3$	00410	47.
Chloride	00940	184.
Hardness As $CaCO_3$	00900	139.
Residue, Filtrable (TDS)	00515	565.
Residue, Non-Filtrable (SS)	00530	1.
Residue	00500	569
Specific Conductance	00095	710 µmhos

PARAMETER	TOTAL	MG/L
Sulfate As SO_4	00945	7.
Surfactants MBAS As LAS	38260	<.1

PRESERVATION GROUP J

PARAMETER		

1. ORGANIZATION REQUESTING ANALYSIS

USAF Clinic/SGPM
Hanscom AFB, MA. 01731

CHEMIST

REVIEWED BY

MAJOR USAF
CHIEF, QUALITY ASSURANCE BRANCH

APPROVED BY

F-15

1. LABORATORY PERFORMING ANALYSIS	3. LAB SAMPLE NUMBER	4. REQUESTOR SAMPLE NUMBER
	69919-20 00008	34800193 00029

SAMPLE COLLECTION INFORMATION			5. DATE RECEIVED BY LAB	6. DATE ANALYSIS COMPLETED
7. SITE DESCRIPTION N.H.S.T.S. -Bldg. 117			9 Jul 80	8 Aug 80
8. SITE LOCATION NO ~~426~~ 4256450713748	9. FLOWRATE AT SITE 00058 unk GAL/MIN	10. WEATHER 00041 5	ON-SITE ANALYTICAL RESULTS	
			16. WATER TEMP 14 00010 °C / 17. PH 5.8 00400 UNITS	18. DISS O_2 unk 00300 MG/L
11. COLLECTION DATE/PERIOD 27 June 1980		12. NAME OF COLLECTOR Tiffany	19. RESULTS OF OTHER ON-SITE ANALYSES	
13. SAMPLING TECHNIQUE Grab		14. PHONE NUMBER 861-2182		
15. REASON FOR SAMPLE SUBMISSION AF Regulations				

ANALYSES REQUESTED AND RESULTS

919

A. PRIMARY DRINKING WATER STANDARDS (40CFR 141)

PRESERVATION GROUP F (219)				PRESERVATION GROUP C			
PARAMETER	TOTAL	μG/L	MAX LEV ALLWD	PARAMETER	TOTAL	MG/L	MAX LEV ALLWD
ARSENIC	01002	<10.	50 μG/L	NITRATE AS N (Cadmium Reduction Method)	00620		10 MG/L
BARIUM	01007	<1000.	1000 μG/L	**PRESERVATION GROUP G**			
				PARAMETER	TOTAL	MG/L	MAX LEV ALLWD
CADMIUM	01027	<10.	10. μG/L	FLUORIDE	00951	.	See table in AFR 161-44
CHROMIUM	01034	<50.	50 μG/L	TURBIDITY	00076	Units	1 Unit
LEAD	01051	<20.	50 μG/L				
MERCURY	71900	<2.	2 μG/L				
SELENIUM	01147	<11.	10 μG/L				
SILVER	01077	<11.	50 μG/L				

B. OTHER ANALYSES

(219) 920

PRESERVATION GROUP F			PRESERVATION GROUP G					
PARAMETER	TOTAL	μG/L	PARAMETER	TOTAL	MG/L	PARAMETER	TOTAL	MG/L
COPPER	01042	119.	Acidity, Mineral As $CaCO_3$	00436	0.	Sulfate As SO_4	00945	6.
IRON	01045	342.	Acidity, Total, As $CaCO_3$	00435	2.2	Surfactants MBAS As LAS	38260	<.1
MANGANESE	01055	<30.	Alkalin, Phenolth As $CaCO_3$	00415	0.			
ZINC	01092	<30.	Alkalinity, Total, As $CaCO_3$	00410	30.			
CALCIUM As Ca	00916	33.4 mg/l	Chloride	00940	180.			
MAGNESIUM as Mg	00927	7.8 mg/l	Hardness As $CaCO_3$	00900	115.			
POTASSIUM	00937	2.9 mg/l	Residue, Filtrable (TDS)	00515	550.	**PRESERVATION GROUP J**		
						PARAMETER		
SODIUM	00929	77.6 mg/l	Residue, Non-Filtrable (SS)	00530	<1			
			Residue	00500	~~540~~ 550			
			Specific Conductance	0009[illegible]	660 μmhos			

1. ORGANIZATION REQUESTING ANALYSIS	CHEMIST
USAF Clinic/SGPM Hanscom AFB, MA. 01731	[signature]
	REVIEWED BY JAMES A. COLL[illegible] MAJOR USAF, [illegible] CHIEF, QUALITY ASSURANCE
	APPROVED BY [signature]

OEHL FORM NOV 76 2 ☆ U.S. GOVERNMENT PRINTING OFFICE 1979-672-398 **POTABLE WATER ANALYSIS**

LABORATORY PERFORMING ANALYSIS	3. LAB SAMPLE NUMBER	4. REQUESTOR SAMPLE NUMBER
	69917-18 00008	34800192 00029

SAMPLE COLLECTION INFORMATION

7. SITE DESCRIPTION: N.H.S.T.S. Bldg. 142			
8. SITE LOCATION NO: 4256370713757	9. FLOWRATE AT SITE 00058 GAL/MIN: unk	10. WEATHER 00041: 5	
11. COLLECTION DATE/PERIOD: 27 June 1980		12. NAME OF COLLECTOR: Tiffany	
13. SAMPLING TECHNIQUE: Grab		14. PHONE NUMBER: 861-2182	
15. REASON FOR SAMPLE SUBMISSION: AF Regulations			

5. DATE RECEIVED BY LAB	6. DATE ANALYSIS COMPLETED
9 Jul 80	8 Aug 80

ON-SITE ANALYTICAL RESULTS

16. WATER TEMP 00010 °C	17. PH 00400 UNITS	18. DISS O_2 00300 MG/L
20	5.8	unk

19. RESULTS OF OTHER ON-SITE ANALYSES

ANALYSES REQUESTED AND RESULTS

A. PRIMARY DRINKING WATER STANDARDS (40CFR 141)

917

PRESERVATION GROUP F 219

PARAMETER	TOTAL	µG/L	MAX LEV ALLWD
ARSENIC	01002	<10	50 µG/L
BARIUM	01007	<1000	1000 µG/L
CADMIUM	01027	<10	10 µG/L
CHROMIUM	01034	<50	50 µG/L
LEAD	01051	<20	50 µG/L
MERCURY	71900	<2	2 µG/L
SELENIUM	01147	<10	10 µG/L
SILVER	01077	<10	50 µG/L

PRESERVATION GROUP C

PARAMETER	TOTAL	MG/L	MAX LEV ALLWD
NITRATE AS N (Cadmium Reduction Method)	00620		10 MG/L

PRESERVATION GROUP G

PARAMETER	TOTAL	MG/L	MAX LEV ALLWD
FLUORIDE	00951		See table in AFR 161-44
TURBIDITY	00076	Units	1 Unit

B. OTHER ANALYSES

PRESERVATION GROUP F

PARAMETER	TOTAL	µG/L
COPPER	01042	746
IRON	01045	361
MANGANESE	01055	<30
ZINC	01092	161
CALCIUM As Ca	00916	34.0 mg/l
MAGNESIUM as Mg	00927	9.0 mg/l
POTASSIUM	00937	3.0 mg/l
SODIUM	00929	75.6 mg/l

918 PRESERVATION GROUP G 219

PARAMETER	TOTAL	MG/L
Acidity, Mineral As $CaCO_3$	00436	0
Acidity, Total, As $CaCO_3$	00435	24.9
Alkalin, Phenolth As $CaCO_3$	00415	0
Alkalinity, Total, As $CaCO_3$	00410	30
Chloride	00940	176
Hardness As $CaCO_3$	00900	119
Residue, * Filtrable (TDS)	00515	~~575~~ 565
Residue, Non-Filtrable (SS)	00530	2
Residue	00500	567
Specific Conductance	00095	660 µmhos

PARAMETER	TOTAL	MG/L
Sulfate As SO_4	00945	7
Surfactants MBAS As LAS	38260	<1

PRESERVATION GROUP J

PARAMETER		

1. ORGANIZATION REQUESTING ANALYSIS

USAF Clinic/SGPM
Hanscom AFB, MA. 01731

* Residue Filtrable (TDS) = 565

CHEMIST: [illegible]

REVIEWED BY: JAMES R. ROLLINS, MAJOR USAF, BSC, CHIEF, QUALITY ASSURANCE

APPROVED BY: [signature]

OEHL FORM NOV 75 2 ☆ U.S. GOVERNMENT PRINTING OFFICE 1979-672-398 POTABLE WATER ANALYSIS

LABORATORY PERFORMING ANALYSIS	3. LAB SAMPLE NUMBER	4. REQUESTOR SAMPLE NUMBER
	69915-16 00008	34800191 00028

SAMPLE COLLECTION INFORMATION

7. SITE DESCRIPTION			5. DATE RECEIVED BY LAB	6. DATE ANALYSIS COMPLETED
N.H.S.T.S. Bldg.118			9 Jul 80	8 Aug 80

ON-SITE ANALYTICAL RESULTS

8. SITE LOCATION NO	9. FLOWRATE AT SITE 00058 GAL/MIN	10. WEATHER 00041	16. WATER TEMP 00010 °C	17. PH 00400 UNITS	18. DISS O_2 00300 MG/L
425645071374A	unk	5	18	6.0	unk

11. COLLECTION DATE/PERIOD	12. NAME OF COLLECTOR	19. RESULTS OF OTHER ON-SITE ANALYSES
27 June 1980	Tiffany	
13. SAMPLING TECHNIQUE	**14. PHONE NUMBER**	
Grab	861-2182	
15. REASON FOR SAMPLE SUBMISSION		
AF Regulations		

ANALYSES REQUESTED AND RESULTS

A. PRIMARY DRINKING WATER STANDARDS (40CFR 141)

915

PRESERVATION GROUP F (214)

PARAMETER	TOTAL	µ G/L	MAX LEV ALLWD
ARSENIC	01002	<10	50 µ G/L
BARIUM	01007	<1000	1000 µ G/L
CADMIUM	01027	<10	10. µ G/L
CHROMIUM	01034	<50	50 µ G/L
LEAD	01051	<20	50 µ G/L
MERCURY	71900	<2	2 µ G/L
SELENIUM	01147	<10	10 µ G/L
SILVER	01077	<10	50 µ G/L

PRESERVATION GROUP C

PARAMETER	TOTAL	MG/L	MAX LEV ALLWD
NITRATE AS N (Cadmium Reduction Method)	00620		10 MG/L

PRESERVATION GROUP G

PARAMETER	TOTAL	MG/L	MAX LEV ALLWD
FLUORIDE	00951		See table in AFR 161-44
TURBIDITY	00076	Units	1 Unit

B. OTHER ANALYSES

PRESERVATION GROUP F

PARAMETER	TOTAL	µG/L
COPPER	01042	371
IRON	01045	716
MANGANESE	01055	<50
ZINC	01092	92
CALCIUM As Ca	00916	22.6 mg/l
MAGNESIUM as Mg	00927	2.0 mg/l
POTASSIUM	00937	2.9 mg/l
SODIUM	00929	79.5 mg/l

916 PRESERVATION GROUP G (214)

PARAMETER	TOTAL	MG/L
Acidity, Mineral As $CaCO_3$	00436	0
Acidity, Total, As $CaCO_3$	00435	3.1
Alkalin, Phenolth As $CaCO_3$	00415	0
Alkalinity, Total, As $CaCO_3$	00410	22
Chloride	00940	180
Hardness As $CaCO_3$	00900	114
Residue, Filtrable (TDS)	00515	~~512~~ 541
Residue, Non-Filtrable (SS)	00530	<1
Residue	00500	541
Specific Conductance	00095	670 µmhos
Sulfate As SO_4	00945	7
Surfactants MBAS As LAS	38260	<.1

PRESERVATION GROUP J

PARAMETER	TOTAL	MG/L

1. ORGANIZATION REQUESTING ANALYSIS	CHEMIST
USAF Clinic/SGPM Hanscom AFB,MA. 01731	DSB 7/31 RMP DJD
	REVIEWED BY
	APPROVED BY

F-12

OEHL FORM NOV 76 2   U.S. GOVERNMENT PRINTING OFFICE 1979-672-398   POTABLE WATER ANALYSIS

ALL RESULTS ARE IN (MG/L) EXCEPT AS NOTED

	SAMPLE IDENTITY		TEST PARAMETER	RESULTS
10	BLDG. 100	1070	CHLORIDE	340
11	200' TOWER	1070	CHLORIDE	8
12	400' TOWER	1070	CHLORIDE	24
13	WELL #1	1640	SODIUM	52.5
14	WELL #2	1640	SODIUM	48.5
15	WELL #3 TRAILER CKT.	1640	SODIUM	12.0

********************END*******************

CHEMSERVE Powers Street Milford, New Hampshire 03055 603 673-5440

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DET 2, AFSCF/DE

CHEMSERVE INCORPORATED
POWERS STREET
MILFORD NEW HAMPSHIRE 03055
603-673-5440

DET 2, AFSCF/DE
NBAFS
New Hampshire
03108

Laboratory # 8125
Date Sampled 3/16/84
Date Received 3/16/84
Date Complete 3/19/84

ID # 2410 Sampler: Robert Hertzog

All analyses performed in accordance with U.S.E.P.A. methods.

Certified by :

All results are in (mg/l) except as noted.

SAMPLE IDENTITY	TEST PARAMETER	RESULTS
Well #1	Sodium	58.7
	Chlorides	138
Well #2	Sodium	75.2
	Chlorides	159
Well #3	Sodium	7.6
	Chlorides	0.14

*************************** END **************************

Na / CL

A, S, 14A

CHEMSERVE INCORPORATED
POWERS STREET
MILFORD NEW HAMPSHIRE 03055
603-673-5440

DET 2, AFSCF/DE
NBAFS
New Hampshire
03103

Laboratory # 9193
Date Sampled 5/4/84
Date Received 5/4/84
Date Complete 5/9/84

ID # 2412

Sampler: Robert Hartzog

All analyses performed in accordance with U.S.E.P.A. methods.

Certified by :

All results are in (mg/l) except as noted

SAMPLE IDENTITY	TEST PARAMETER	RESULTS
Well #1	Sodium	[illegible]
	Chlorides	[illegible]
Well #2	Sodium	[illegible]
	Chlorides	[illegible]
[illegible]	Sodium	[illegible]
	Chlorides	[illegible]

****************** END ******************

RECEIVED
MAY 14 1984
DET 2, AFSCF/DE

Bob for your info
Robt.

- Potable well water -

Mg L.

Well - test	28 Feb. 84 1 QTR.	16 Mar. 84 2 QTR	4 May 84 3 QTR.	4 QTR
1 - sodium	55.0	58.7	71.7	
2 - sodium	72.0	75.2	75.1	
3 - sodium	8.0	7.6	8.1	
1 - chloride	154.0	138.0	223.0	
2 - chloride	200.0	159.0	223.0	
3 - chloride	6.0	0.14	37	

DEPARTMENT OF THE AIR FORCE
DETACHMENT 2, AFSCF (AFSC)
NEW BOSTON AIR FORCE STATION, NH 03103

12 October 1984

REPLY TO ATTN OF: DEM

SUBJECT: Water Analysis

TO: CC

1. Attached is a chart reflecting accumulated data available on our potable water sodium and chloride content.

2. The sodium and chloride samples taken in May 1984 were taken by Mr. Parsons, due to an absence of plumbers. Both samples were taken from the same source (where the piping of the 2 wells join together) resulting in the test analysis as shown. This was not discovered until the May results were received by this office. All future samples will only be taken by the plumbers or the structures foreman.

3. The chloride samples taken on 30 Aug 84 for Well #1 and #2 jumped considerably in concentration. At this time, we have been unable to ascertain why the results are so high. It is possible that a mistake was made at the laboratory, or when the plumbers collected the sample. The next test in November 1984 should add some light to this.

4. Because of the high concentration of chlorides noted in August 1984, I contacted Mr. Harry Stewart of the New Hampshire Water Supply and Pollution Control Commission (NHWS&PCC). After identifying the historical record of our sampling results he feels, as I do, that it is possible that Chemserve might have made a mistake in their test results. The only way we have of clarifying would be to send a sample to the NHWS&PCC laboratory for analysis. Their test would cover 8 parameters at a charge of $30.00. If the Chemserve report for November 1984 shows a similar high concentration of chlorides, then I will pursue the state analysis. In addition, I will contact Brooks AFB laboratory for a complete set of safe drinking water act tests to include exotic metals and sodium potassium. Mr. Stewart recommended that we incorporate into our service contract with Chemserve added tests for sodium potassium, calcium, hardness and PH to see if there is a correlation with the high concentration of chlorides. I will also hold off on these additional tests until the November 1984 test results have been received and analyzed. I will pursue these courses of action and keep you informed as they progress.

ROBERT HARTZOG, JR.
Chief of Operations
Civil Engineering Branch

1 Atch
Water Analysis Data

WELL	LOCATION	TEST	REC. MAX. LEVELS	WELL #2 FROM OCT 1963 TO MAY 1977	9 JUL 80 *AVE.9 SAMPLES BROOKS AFB	27 JUL 82 CHEMSERVE	3 FEB 83 CHEMSERVE	18 Apr 83 BROOKS AFB	28 FEB 84 CHEMSERVE
1	Vicinity Bldg 141	Sodium	20 mgl		*87.32		52.5	56.4	55.0
2	Bldg 111	Sodium	20 mgl		71.9		48.5	56.4	72.0
3	Trailers	Sodium	20 mgl				12.0	8.8	8.0
1	Vicinity Bldg 141	Chloride	250 mgl		*179.56	191.0		160.0	154.0
2	Bldg 111	Chloride	250 mgl	19.0 to 155.0	196.0	191.0		160.0	200.0
3	Trailers	Chloride	250 mgl					4.0	6.0
100	Ground Well Bldg	Chloride	N/A				340 mgl		
200	200' Tower	Chloride	N/A				8 mgl		
400	400' Tower	Chloride	N/A				24 mgl		

WELL	LOCATION	TEST	REC. MAX. LEVELS	16 MAR 84 CHEMSERVE	4 MAY 84 CHEMSERVE	30 AUG 84 CHEMSERVE
1	Vicinity Bldg 141	Sodium	20 mgl	58.7	71.7	58.2
2	Bldg 111	Sodium	20 mgl	75.2	75.1	74.5
3	Trailers	Sodium	20 mgl	7.6	8.1	7.9
1	Vicinity Bldg 141	Chloride	250 mgl	138.0	223.0	542.2
2	Bldg 111	Chloride	250 mgl	159.0	223.0	705.1
3	Trailers	Chloride	250 mgl	0.14	37.0	24.4
100	Ground Well Bldg	Chloride	N/A			
200	200' Tower	Chloride	N/A			
400	400' Tower	Chloride	N/A			

DEPARTMENT OF THE AIR FORCE
DETACHMENT 2, AFSCF (AFSC)
NEW BOSTON AIR FORCE STATION, NH 03103

REPLY TO ATTN OF: DEM

11 December 1984

SUBJECT: Water Analysis

TO: CC

1. Attached is the updated water quality chart showing the potable water sodium and chloride content to date.

2. The sodium level in well #1 has leveled off, but well #2 shows a marked increase from 74.5 to 102.82 mgl.

3. All of the chloride samples have settled down to a comparable level of samples taken before 30 Aug 84. Apparently, a mistake was made in the Aug 84 test by our people or Chemserve.

4. I have secured containers and preservation agents required for the potable water samples that we will send to Brooks AFB. Those samples will be sent to Brooks for complete water analysis. I will pursue these courses of action and keep you informed as they progress.

Robert Hartzog Jr.

ROBERT HARTZOG, JR.
Chief of Operations
Civil Engineering Branch

1 Atch
Water Analysis Data

WELL	LOCATION	TEST	REC. MAX. LEVELS	WELL #2 FROM OCT 1963 TO MAY 1977	9 JUL 80 *AVE.9 SAMPLES BROOKS AFB	27 JUL 82 CHEMSERVE	3 FEB 83 CHEMSERVE	18 Apr 83 BROOKS AFB	28 FEB 8 CHEMSERV
1	Vicinity Bldg 141	Sodium	20 mgl		*87.32		52.5	56.4	55.0
2	Bldg 111	Sodium	20 mgl		71.9		48.5	56.4	72.0
3	Trailers	Sodium	20 mgl				12.0	8.8	8.0
1	Vicinity Bldg 141	Chloride	250 mgl		*179.56	191.0		160.0	154.0
2	Bldg 111	Chloride	250 mgl	19.0 to 155.0	196.0	191.0		160.0	200.0
3	Trailers	Chloride	250 mgl					4.0	6.0
100	Ground Well Bldg	Chloride	N/A				340 mgl		
200	200' Tower	Chloride	N/A				8 mgl		
400	400' Tower	Chloride	N/A				24 mgl		

WELL	LOCATION	TEST	REC. MAX. LEVELS	16 MAR 84 CHEMSERVE	4 MAY 84 CHEMSERVE	30 AUG 84 CHEMSERVE	21 NOV 84 CHEMSERVE
1	Vicinity Bldg 141	Sodium	20 mgl	58.7	71.7	58.2	56.9
2	Bldg 111	Sodium	20 mgl	75.2	75.1	74.5	102.82
3	Trailers	Sodium	20 mgl	7.6	8.1	7.9	13.48
1	Vicinity Bldg 141	Chloride	250 mgl	138.0	223.0	542.2	189.0
2	Bldg 111	Chloride	250 mgl	159.0	223.0	705.1	233.0
3	Trailers	Chloride	250 mgl	0.14	37.0	24.4	24.0
100	Ground Well Bldg	Chloride	N/A				
200	200' Tower	Chloride	N/A				
400	400' Tower	Chloride	N/A				

File 13A-26

DEPARTMENT OF THE AIR FORCE

HEADQUARTERS SPACE DIVISION (AFSC)
LOS ANGELES AIR FORCE STATION, PO BOX 92960, WORLDWAY POSTAL CENTER
LOS ANGELES CA 90009

16 MAY 1984

REPLY TO ATTN OF: SGX (Lt Stiles, AV 833-0008)

SUBJECT: Annual Det 2 Bioenvironmental Engineering Staff Assistance Visit

TO: AFSCF Det 2/CC
New Boston AFS, NH 03108

1. A staff assistance visit was performed 18-19 April 1984 at New Boston AFS, NH. The purpose of the trip was twofold. The first purpose was to evaluate the occupational, public and environmental programs at New Boston AFS. The second purpose was to have an Installation Restoration Program (IRP) orientation.

2. I surveyed all of the industrial work areas on station and the occupational and environmental health programs were well managed overall. The following comments and recommendations are offered to further improve these programs.

a. Sewage Treatment Plant - Sewage treatment workers should not be receiving Environmental Differential Pay (EDP) according to a recent "AF Occupational Environmental Health Laboratory News Letter." To remove the sewage treatment workers from the program, Captain Donnelly, the Bioenvironmental Engineer at Hanscom, recommended that civilian personnel at New Boston AFS resubmit all requests for EDP through Hanscom AFB. The Bioenvironmental Engineering Office, Hanscom AFB, will review the applications and make recommendations accordingly. Request an update by 1 August 1984.

b. Also, during my survey of the sewage treatment plant I noted that the refrigerator was not placarded with a sign saying "NO FOOD." Although no food was present, a sign should be properly displayed on the refrigerator to prevent food contamination.

c. Water Quality - I reviewed the water quality data from the ground water wells. The sodium levels were high, in some cases greater than 75 mg/l. Neither the State of New Hampshire nor the Air Force regulates sodium concentrations in drinking water. However, as a point of reference the State of Massachusetts recommends less than 20 mg/l of sodium. I consulted the AF Occupational Environmental Health Laboratory at Brooks AFB, TX, concerning the sodium levels. They feel there is no significant health hazard associated with sodium concentrations of 75 mg/l or less. They did, however, recommend that people on salt restricted diets get their water from sources containing less than 20 mg/l sodium. In addition, they knew of no cases where the Air Force provided bottled water due to high sodium concentrations.

d. Although it is not a significant health problem now, it should be closely monitored. The sodium source should also be confirmed. Perhaps a study could be conducted in conjunction with IRP Phase II monitoring. In the meantime, secure the two salt storage areas from run-off as much as possible to ensure the sodium concentrations do not increase. Road salting in the winter, in the vicinity of the wells, should be limited when possible.

e. Motor Pool - The battery room smelled of acid. During the next Hanscom/SGPB survey, a screening air sample may be required.

f. Building 17 - I examined the pipe insulation and found it to be satisfactory. During the last visit, the pipe insulation containing asbestos was exposed. It has since been retaped. If this insulation is ever removed, an appropriate respirator approved by the Hanscom Bioenvironmental Engineer must be worn.

g. RF Antennas - A RF Survey was conducted in 1978. As long as the operating procedures have not changed, a new survey is not necessary. If, however, the operating procedures change, notify our office. In most cases, calculations can be done to assess the impact.

h. 11-4 Host-Tenant Agreements - Following my visit to New Boston AFS I spoke to Captain Donnelly, the Bioenvironmental Engineer at Hanscom. His shop, USAF Clinic/SGPB, has not been providing biannual 11-4 host-tenant support because there is no specific Bioenvironmental Engineering 11-4 host-tenant agreement with New Boston AFS and USAF Clinic Hanscom/SGPB. This problem has been addressed by Hanscom and Space Division in the past survey reports.

i. It is especially important now that this issue gets resolved. Space Division/SGX has received guidance from HQ AFSC not to continue the routine annual staff assistance visits. Space Division will continue to support New Boston AFS as necessary. However, we will depend on Hanscom/SGPB to provide the routine Bioenvironmental Engineering support. Until there is a 11-4 host-tenant agreement between New Boston AFS and USAF Clinic Hanscom/SGPB, SGPB has no requirement to s pport you. Captain Donnelly can provide assistance in the wording of the 11-4 agreement if necessary. Request an update by 1 August 1984.

3. Phase I Installation Restoration Program (IRP) should begin this fall at New Boston AFS. Phase I is a records search to identify potential hazardous waste sites. SD/SGX will be a member of the board for the selection of a Phase I contractor. However, during Phase II SGX's involvement will greatly increase. SGX will be the OPR for any Phase II environmental monitoring activities. This visit was a good orientation to some of the potential problem areas and several maps were collected which will also aid us in developing a monitoring strategy, if monitoring is necessary.

4. Everyone was very helpful during the visit. TSgt Richard and Mr. Gordon Moore were particularly helpful during the site surveys. If there are any questions concerning this report, please contact me at AV 833-0008.

Susan C. Stiles

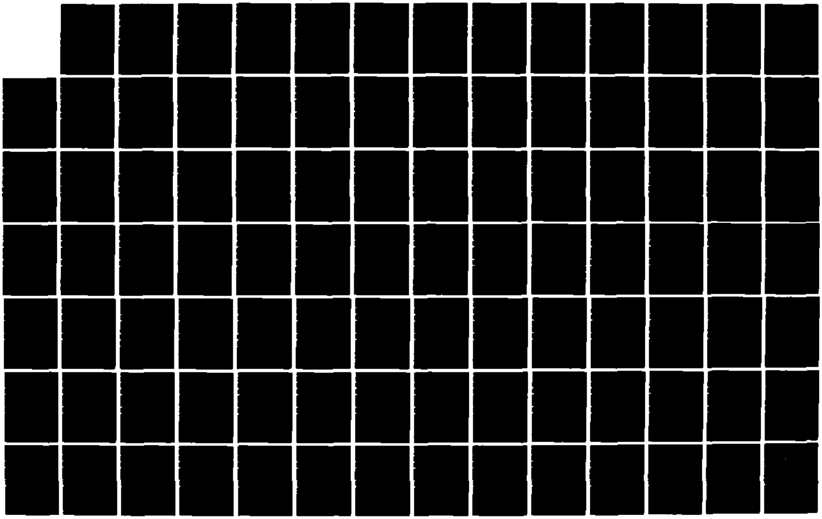
SUSAN C. STILES, 2d Lt, USAF, BSC
Bioenvironmental Engineer

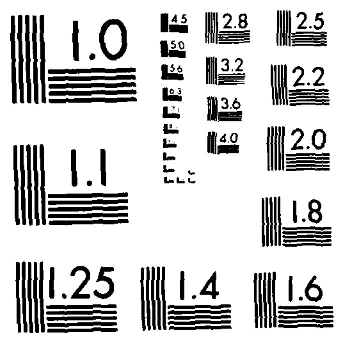
Cy to: AFSCF/RO
USAF Clinic Hanscom/SGPB
SD/DEV (John Edwards)
SD/SE

ATTACHMENT #1:

RANDOM WATER ANALYSES OF NHSTS MAIN WATER SOURCE (WELL #2), DATED BETWEEN OCTOBER 1962 AND MAY 1977 BY THE NEW HAMPSHIRE WATER SUPPLY AND POLLUTION CONTROL COMMISSION

AD-A157 633 INSTALLATION RESTORATION PROGRAM PHASE I RECORDS SEARCH 3/4
NEW BOSTON AIR FO. (U) ENVIRONMENTAL SCIENCE AND
ENGINEERING INC GAINESVILLE FL M A KEIRN ET AL. JUL 85
UNCLASSIFIED SD-TR-85-32 F04701-84-C-0115 F/G 13/2 NL





MICROCOPY RESOLUTION TEST CHART

DARDS-1963-A

The State of New Hampshire

Water Supply and Pollution Control Commission
Prescott Park
105 Loudon Road
Concord 03301

DHW

Donald F. Bent, Ph.D., Director

SANITARY WATER ANALYSIS

PARTS PER MILLION

N. H. Satellite Tracking Station C.C.E.
6594th. Int. Sqdn.
Manchester, NH 03103

May 11, 1977

Serial number	53001			
Supply of or samples from: pump #2 well-250 ft. New Boston	Bldg. 111			
Date collected	5/4/77			
*Turbidity				
*Sediment				
*Odor				
Color	5			
Free ammonia nitrogen				
Alb. ammonia nitrogen				
pH	6.3			
Nitrate nitrogen	0.35			
Nitrite nitrogen				
Chloride	155			
Hardness	116			
Iron	0.18			
Copper	less than .1			
Lead				
Phenolphthalein Alkalinity				
Total Alkalinity				
Manganese	0.07			
Fluoride				
Polyphosphate				
Synthetic Detergent (LAS)				
Coliform M.P.N. per 100 c.c.				
Total Coliform count per 100 ml.	less than 1			

Richard J. Walsh, Jr.

The State of New Hampshire
Water Supply and Pollution Control Commission
Prescott Park
105 Loudon Road
Concord 03301

FRANCIS D. HOUGHTON
CHIEF OF LABORATORIES

FHW

SANITARY WATER ANALYSIS

PARTS PER MILLION

FROM State LAB BLDG
HAZEN DRIVE
CONCORD 03301

New Hampshire Satellite Tracking Station BCE
6594 th Inst. Sqdn.
Manchester, NH 03103

January 6, 1977

Serial number	48261			
Supply of or samples from: U. S. Air Force New Boston, NH well-250 feet	pump bldg. 111			
Date collected	1/4/77			
*Turbidity				
*Sediment				
*Odor				
Color	10			
Free ammonia nitrogen				
Alb. ammonia nitrogen				
pH	6.5			
Nitrate nitrogen	0.90			
Nitrite nitrogen				
Chloride	100			
Hardness	106			
Iron	.22			
Copper	less than .1			
Lead				
Phenolphthalein Alkalinity				
Total Alkalinity				
Manganese	less than .05			
Fluoride				
Polyphosphate				
Synthetic Detergent (LAS)				
Coliform M.P.N. per 100 c.c.				
Total Coliform count per 100 ml.	less than 1			

Hardness=106 ppm.

F-41

Richard J. Walsh, Jr.

|

Water Supply and Pollution Control Commission

WATER AN 'SIS REPORT

Laboratory No. 45046

Date received 1971

Hampshire
Control Commission
ark
Road
3301

ANALYSIS
-ION

Analysis of this water sample shows its quality, *at the time of collection*, to be as indicated below:

- ☐ a. Satisfactory. Safe for drinking and all household purposes.
- (b. Shows undesirable bacterial contamination, but otherwise of good quality. This result is most frequently due either to inadequate well construction or infection of the sample during collection. Improvement in construction, followed by disinfection of the well, may be all that is required to remedy the situation. This water is to be considered unsafe for drinking so long as the contamination persists.
- ☐ c. Of more or less poor quality. The bacterial and/or chemical findings are suggestive of contamination from a potentially dangerous source such as a sanitary waste disposal system. Safety for drinking is questionable until the probable source of contamination has been determined. If the location of nearby septic systems (or similar waste materials or animal or human origin) leads you to conclude that these could not be a contaminating influence on the water supply, the water is probably safe for drinking. However, you should secure periodic analyses (about every 6 to 12 months) to determine whether quality is deteriorating or remaining the same.
- X d. Poor quality but not readily attributable to contamination from a sanitary disposal system. The results are suggestive of drainage from a salted highway [redacted]. Safe for drinking (unless *b* or *e* is also checked) but may become unpalatable because of the high salt content. Chlorination of the supply could also produce this result.
- ☐ e. Unsatisfactory. Bacterial and/or chemical quality is indicative of contamination from a potentially dangerous source. UNSAFE FOR DRINKING. Removal of the contaminating source may result in gradual improvement in quality but such may require considerable time. It is probably more advisable to seek an alternate source.
- X f. In addition to any conditions checked above, this supply shows excessive amounts of [redacted] manganese. While not a health problem, these can result in staining of laundry or bathroom fixtures. An iron removal unit may be required for correction of the problem.
- ☐ g. Unsafe for infants due to high nitrate content.

DHW

Water Testing Laboratory
Hazen Drive
Concord, N. H. 03301

Richard J. Walsh, Jr.

Richard J. Walsh, Jr., *Supervisor*

If you find it necessary to write us regarding this report, you must include the La ratory Number shown above as well as the Town in which the supply is located. The Number alone is not sufficient for identification.

ctober 13, 1976

Serial Number	45046			
Supply of or samples from: well-250 feet New Boston, NH	pump Bldg. 111			
Date collected	10/4/76			
*Turbidity				
*Sediment				
*Odor				
Color	5			
Free ammonia nitrogen				
Alb. ammonia nitrogen				
pH	5.8			
Nitrate nitrogen	0.50			
Nitrite nitrogen				
Chloride	90			
Hardness	94			
Iron	.27			
Copper	less than .1			
Lead				
Phenolphthalein Alkalinity				
Total Alkalinity				
Manganese	.06			
Fluoride				
Polyphosphate				
Synthetic Detergent (LAS)				
Coliform M.P.N. per 100 c.c.				
Total Coliform count per 100 ml.	less than 1 *			

* Meets U. S. Public Health Service Standards for Human Consumption.

Richard J. Walsh, Jr.

F-42

Lab # 45046 10-27-76

DE/DHW 00

The State of New Hampshire
Water Supply and Pollution Control Commission
Prescott Park
105 Loudon Road
Concord 03301

FRANCIS D. HOUGHTON
CHIEF OF LABORATORIES

SANITARY WATER ANALYSIS
PARTS PER MILLION

N. H. Satellite Tracking Station, B.C.E.
6594 Inst. Sqdn.
Manchester, NH 03103

September 15, 1976

Serial number	43624			
Supply of or samples from: #2 well-250 ' New Boston, NH	Bldg. 111			
Date collected	9/2/76			
*Turbidity	2.8			
*Sediment				
*Odor				
Color	15			
Free ammonia nitrogen				
Alb. ammonia nitrogen				
pH	6.6			
Nitrate nitrogen	1.30			
Nitrite nitrogen				
Chloride	53.0			
Hardness	86			
Iron	0.32			
Copper	0.16			
Lead				
Phenolphthalein Alkalinity				
Total Alkalinity				
Manganese	less than .05			
Fluoride				
Polyphosphate				
Synthetic Detergent (LAS)				
Coliform M.P.N. per 100 c.c.				
Total Coliform count per 100 ml.	less than 1*			

* Meets U. S. Public Health Service Standards for Human Consumption.

Richard J. Walsh, Jr.

DNW

FRANCIS D. HOUGHTON

CHIEF OF LABORATORIES

The State of New Hampshire
Water Supply and Pollution Control Commission
Prescott Park
105 Loudon Road
Concord 03301

SANITARY WATER ANALYSIS

PARTS PER MILLION

New Hampshire Satellite Tracking Station
6594th Inst. Sqdn.
Manchester, NH 03103

June 15, 1976

Serial number	37399			
Supply of or samples from: New Boston U. S. Air Force Well-250 feet	pump Bldg. 111			
Date collected	6/2/76			
•Turbidity	0			
•Sediment				
•Odor				
Color	0			
Free ammonia nitrogen				
Alb. ammonia nitrogen				
pH	6.2			
Nitrate nitrogen	0.75			
Nitrite nitrogen				
Chloride	145.0			
Hardness	104			
Iron	.14			
Copper	less than .1			
Lead				
Phenolphthalein Alkalinity				
Total Alkalinity				
Manganese	less than .05			
Fluoride				
Polyphosphate				
Synthetic Detergent (LAS)				
Coliform M.P.N. per 100 c.c.				
Total Coliform count per 100 ml.	less than 1 *			

* Meets U. S. Public Health Service Standards for Human Consumption.

Richard J. Walsh, Jr.

FRANCIS D. HOUGHTON

CHIEF OF LABORATORIES

The State of New Hampshire
Water Supply and Pollution Control Commission
Prescott Park
105 Loudon Road
Concord 03301

SANITARY WATER ANALYSIS

PARTS PER MILLION

N.H.S.B.C.E.
6594th Inst.
Manchester, NH 03103

[illegible] 9 1976

Serial number	#32517			
Supply of or samples from: New Boston, NH *v	U.S. Air Force Well House 11 Pump			
Date collected	1/5/76			
*Turbidity	0			
*Sediment				
*Odor				
Color	5			
Free ammonia nitrogen				
Alb. ammonia nitrogen				
pH	6.3			
Nitrate nitrogen	0.75			
Nitrite nitrogen				
Chloride	75.0			
Hardness	92			
Iron	.10			
Copper	less than .1			
Lead				
Phenolphthalein Alkalinity				
Total Alkalinity				
Manganese	less than .05			
Fluoride				
Polyphosphate				
Synthetic Detergent (LAS)				
Coliform M.P.N. per 100 c.c.				
Total Coliform count per 100 ml.	less than 1			

The State of New Hampshire
Water Supply and Pollution Control Commission
Prescott Park
105 Loudon Road
Concord 03301

FRANCIS D. HOUGHTON
CHIEF OF LABORATORIES

SANITARY WATER ANALYSIS

PARTS PER MILLION

N.H.S.T.S. BCE
6594 Inst. Sqdn.
Manchester, N.H. 03103

12/12/75

Serial number	31929	31930		
Supply of or samples from: U.S. Air Force	#2 Well, 250 ft. Pump Bldg. 111	#3 Well, 150 ft. Pump Bldg. 112		
Date collected	12/4/75	12/4/75		
*Turbidity				
*Sediment				
*Odor				
Color	0	20		
Free ammonia nitrogen				
Alb. ammonia nitrogen				
pH	6.4	6.4		
Nitrate nitrogen	0.60	0.35		
Nitrite nitrogen				
Chloride	99.0	76.0		
Hardness	58	54		
Iron	Less than .1	10.7		
Copper	Less than .1	Less than .1		
Lead				
Phenolphthalein Alkalinity				
Total Alkalinity				
Manganese	1.10	Less then .05		
Fluoride				
Polyphosphate				
Synthetic Detergent (LAS)				
Coliform M.P.N. per 100 c.c.				
Total Coliform count per 100 ml.	Less than 1	Less than 1		

CE 2
LRO —
File —

The State of New Hampshire
Water Supply and Pollution Control Commission
Prescott Park
105 Loudon Road
Concord 03301

FRANCIS D. HOUGHTON
CHIEF OF LABORATORIES

SANITARY WATER ANALYSIS
PARTS PER MILLION

NHSTS BCE
6594th Inst. Squadron
Manchester, N.H.

5/19/75

Serial number	22508	22509		
Supply of or samples from:	#2 well pump Bldg. 111	#3 well pump Bldg. 112		
Date collected	5/6/75	5/6/75		
•Turbidity	0	5		
•Sediment				
•Odor				
Color	0	40		
Free ammonia nitrogen				
Alb. ammonia nitrogen				
pH	6.4	6.4		
Nitrate nitrogen	Less .1	Less .1		
Nitrite nitrogen				
Chloride	110.	75.		
Hardness	83	96		
Iron	.32	9.04		
Copper	Less .1	Less .1		
Lead				
Phenolphthalein Alkalinity				
Total Alkalinity				
Manganese	Less .05	1.05		
Fluoride	.17	.17		
Polyphosphate				
Synthetic Detergent (LAS)				
Coliform M.P.N. per 100 c.c.				
Total Coliform count per 100 ml.	Less than 1	Less than 2		

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The State of New Hampshire
Water Supply and Pollution Control Commission
Prescott Park
105 Loudon Road
Concord 03301

FRANCIS D. HOUGHTON
CHIEF OF LABORATORIES

SANITARY WATER ANALYSIS
PARTS PER MILLION

NHSTS BCE
6594th Inst. Sqd.
Manchester, N.H. 03103

3/7/75

Serial number	20100	20101		
Supply of or samples from: Pump	Bldg. 111 Well #2	Bldg. 112 Well #3		
Date collected	XXXXXX 3/3/75	3/3/75		
•Turbidity	0	5		
•Sediment				
•Odor				
Color	10	50		
Free ammonia nitrogen				
Alb. ammonia nitrogen				
pH	6.2	6.7		
Nitrate nitrogen	Less .1	Less .1		
Nitrite nitrogen	trace	XXXX Trace		
Chloride	80.	XXX 120.		
Hardness	76	XXXX128		
Iron	.53	Less .1 XXX 10.0		
Copper	Less .1	Less .1		
Lead				
Phenolphthalein Alkalinity				
Total Alkalinity				
Manganese	Less .05			
Fluoride		.6		
Polyphosphate				
Synthetic Detergent (LAS)				
Coliform M.P.N. per 100 c.c.				
Total Coliform count per 100 ml.	Less than 1	Less than 1		

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SANITARY WATER ANALYSIS

PARTS PER MILLION

NHSDE
6594th Inst. Sq.
Manchester, N. H. 03103

11/18/74

Serial number	16461	16462		
Supply of or samples from:	well #2 Bldg. 111 Pump Faucet	Bldg. 112 well #3		
Date collected	11/4/74	11/4/74		
*Turbidity	0	5		
*Sediment				
*Odor				
Color	10	40		
Free ammonia nitrogen				
Alb. ammonia nitrogen				
pH	6.4	6.7		
Nitrate nitrogen	11	Less .1		
Nitrite nitrogen	-----	Trace		
Chloride	76.	92.		
Hardness	90	146		
Iron	.1	13.1		
Copper	Less than .1	.1		
Lead				
Phenolphthalein Alkalinity				
Total Alkalinity				
Manganese	Less 0.5	.8		
Fluoride				
Polyphosphate				
Synthetic Detergent (LAS)				
Coliform M.P.N. per 100 c.c.				
Total Coliform count per 100 ml.	Less than 1	Less than 1		

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SANITARY WATER ANALYSIS

PARTS PER MILLION

NHS DE
6594 Inst. Sq.
Manchester, N.H. 03103

10/21/74

Serial number	14383			
Supply of or samples from: well # 2	Bldg. 111			
Date collected	10/3/74			
*Turbidity	0			
*Sediment				
*Odor				
Color	0			
Free ammonia nitrogen				
Alb. ammonia nitrogen				
pH	6.8			
Nitrate nitrogen	.17			
Nitrite nitrogen	---			
Chloride	68.			
Hardness	80			
Iron	Less than .1			
Copper	Less than .1			
Lead				
Phenolphthalein Alkalinity				
Total Alkalinity				
Manganese	.05			
Fluoride				
Polyphosphate				
Synthetic Detergent (LAS)				
Coliform M.P.N. per 100 c.c.				
Total Coliform count per 100 ml.	Less than 1			

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SANITARY WATER ANALYSIS

PARTS PER MILLION

NHS DB
6594th Inst. Sq.
Manchester, N.H. 03103

Aug. 12, 1974

Serial number	12552			
Supply of or samples from: Bldg. 111	well #2 Pump faucet			
Date collected	8/5/74			
*Turbidity	0			
*Sediment				
*Odor				
Color	20			
Free ammonia nitrogen				
Alb. ammonia nitrogen				
pH	6.3			
Nitrate nitrogen	.94			
Nitrite nitrogen	------			
Chloride	58.			
Hardness	84			
Iron	.19			
Copper	Less than .1			
Lead				
Phenolphthalein Alkalinity				
Total Alkalinity				
Manganese	Less than.6			
Fluoride				
Polyphosphate				
Synthetic Detergent (LAS)				
Coliform M.P.N. per 100 c.c.				
Total Coliform count per 100 ml.	Less than 1			

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SANITARY WATER ANALYSIS

PARTS PER MILLION

NHS-DE
6594th Instr. Sq.
Manchester, N.H. 03103

May 10, 1972

Serial number	64986	64987		
Supply of or samples from: Air Force Well 150 ft. New Boston	Bldg. 112 Pump-Faucet #3	Pump Faucet Bldg. 111 #2		
Date collected	5/3/72	5/3/72		
•Turbidity	2	0		
•Sediment	5	3		
•Odor	0	0		
Color	25	5		
Free ammonia nitrogen				
Alb. ammonia nitrogen				
pH	6.1	6.2		
Nitrate nitrogen	Less than .1	.20		
Nitrite nitrogen	---	---		
Chloride	56.	84.		
Hardness	100	78		
Iron	6.85	.42		
Copper	Less than .1	Less than .1		
Lead				
Phenolphthalein Alkalinity				
Total Alkalinity				
Manganese	1.35	.05		
Fluoride				
Polyphosphate				
Synthetic Detergent (LAS)				
Coliform M.P.N. per 100 c.c.				
Total Coliform count per 100 ml.	Less than 1	Less than 1		

Results as indicated.

Walter Moore

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SANITARY WATER ANALYSIS

PARTS PER MILLION

N.A.S. DE
6594th Instr. Sqdn.
Grenier Air Force Base
Manchester, N.H.

July 13, 1972

Serial number	68078	68079		
Supply of or samples from: Air Force New Boston well	Pump - faucet Bldg. 112 #3	Pump -faucet Bldg. 111 #2		
Date collected	7/5/72	7/5/72		
*Turbidity	5	0		
*Sediment	5	3		
*Odor	0	0		
Color	35	0		
Free ammonia nitrogen				
Alb. ammonia nitrogen				
pH	6.1	6.1		
Nitrate nitrogen	Less than .1	1.20		
Nitrite nitrogen	---	---		
Chloride	30.	90.		
Hardness	62	66		
Iron	5.0	Less than .1		
Copper		Less than .1		
Lead	Less than .1			
Phenolphthalein Alkalinity				
Total Alkalinity				
Manganese	1.30	Less than .05		
Fluoride				
Polyphosphate				
Synthetic Detergent (LAS)				
Coliform M.P.N. per 100 c.c.				
Total Coliform count per 100 ml.	Less than 1	Less than 1		

Results as indicated.

Walter Moore
7-18-72

F-64

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SANITARY WATER ANALYSIS

PARTS PER MILLION

N.H.S. DE
6594th Inst. Squadron
Manchester, N. H. 03103

271-1110
271-3502

Serial number	70986	70987		
Supply of or samples from: NEW BOSTON	Bldg. 111 #2	Bldg. 112 #3		
Date collected	8/7/72	8/7/72		
*Turbidity	0	1		
*Sediment	1	5		
*Odor	0	0		
Color	0	50		
Free ammonia nitrogen				
Alb. ammonia nitrogen				
pH	6.4	6.4		
Nitrate nitrogen	2.6	3.8		
Nitrite nitrogen	Trace	--		
Chloride	46	78		
Hardness	35	86		
Iron	.3	11		
Copper	less than .1	less than .1		
Lead				
Phenolphthalein Alkalinity				
Total Alkalinity				
Manganese	less than .05	1.30		
Fluoride				
Polyphosphate				
Synthetic Detergent (LAS)				
Coliform M.P.N. per 100 c.c.				
Total Coliform count per 100 ml.	less than 1	less than 1		

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SANITARY WATER ANALYSIS

PARTS PER MILLION

N. H. S. DE
6594th Inst. Squad.
Manchester, New Hampshire 03101

SEP 1 4 1972

Serial number	73278	73279		
Supply of or samples from: New Boston, NH	Bldg. 111, pump, faucet #2	Well, pump faucet, #3 Bldg. 112		
Date collected	9-6-72	9-6-72		
*Turbidity	0	5		
*Sediment	2	5 iron		
*Odor	0	0		
Color	0	50		
Free ammonia nitrogen				
Alb. ammonia nitrogen				
pH	6.9	6.0		
Nitrate nitrogen	less than 1	less than 1		
Nitrite nitrogen	--------	--------		
Chloride	20.	22.		
Hardness	32	46		
Iron	less than .1	8.8		
Copper	less than .1	less than .1		
Lead				
Phenolphthalein Alkalinity				
Total Alkalinity				
Manganese	less than .05	1.8		
Fluoride				
Polyphosphate				
Synthetic Detergent (LAS)				
Coliform M.P.N. per 100 c.c.				
Total Coliform count per 100 ml.	less than 1	less than 1		

Walter Moore 9-19-72

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SANITARY WATER ANALYSIS

PARTS PER MILLION

NHSTS - DE
6594th Inst. Sq.
Manchester, New Hampshire 03103

NOV 13 1972

Serial number	075979	075980		
Supply of or samples from:	Pump faucet, well #3 Bldg. 112	Pump faucet, well #2 Bldg. 111		
Date collected	11-2-72	11-2-72		
*Turbidity	3	0		
*Sediment	5 iron	1		
*Odor	0	5		
Color	25	5		
Free ammonia nitrogen				
Alb. ammonia nitrogen				
pH	6.3	6.1		
Nitrate nitrogen	0.15	0.20		
Nitrite nitrogen	------	------		
Chloride	44.0	68.1		
Hardness	72	44		
Iron	7.42	.23		
Copper	less than .1	less than .1		
Lead				
Phenolphthalein Alkalinity				
Total Alkalinity				
Manganese	1.0	.05		
Fluoride				
Polyphosphate				
Synthetic Detergent (LAS)				
Coliform M.P.N. per 100 c.c.				
Total Coliform count per 100 ml.	less than 1	less than 1		

Walter R Moore
11-21-72

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PARTS PER MILLION

NHS - DE
6594th Inst. Sq.
Manchester, New Hampshire 03103

DEC 1 4 1972

Serial number	076980	076981		
Supply of or samples from: NEW BOSTON, N.H.	Pump faucet Bldg. 112 #3	Pump faucet Bldg. 111 #2		
Date collected	12=6=72	12=6=72		
•Turbidity	5	0		
•Sediment	5 iron	2		
•Odor	0	Cl_2-1		
Color	35	0		
Free ammonia nitrogen				
Alb. ammonia nitrogen				
pH	5.8	5.8		
Nitrate nitrogen	.3	.4		
Nitrite nitrogen	----	-----		
Chloride	31.	44.		
Hardness	96	76		
Iron	5.90	.58		
Copper	less than .1	less than .1		
Lead				
Phenolphthalein Alkalinity				
Total Alkalinity				
Manganese	1.28	less than .05		
Fluoride				
Polyphosphate				
Synthetic Detergent (LAS)				
Coliform M.P.N. per 100 c.c.				
Total Coliform count per 100 ml.	less than 1	less than 1		

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PARTS PER MILLION

NHS DE
6594th Inst. Sq.
Manchester, N. H. 03103

Serial number	077638	077639		
Supply of or samples from: NEW BOSTON	Bldg. 112 well, faucet #3	Bldg. 111 well, faucet #2		
Date collected	1/3/73	1/3/73		
*Turbidity	5	0		
*Sediment	5	3		
*Odor	0	0		
Color	15	5		
Free ammonia nitrogen				
Alb. ammonia nitrogen				
pH	6.1	6.1		
Nitrate nitrogen	less than .1	less than .1		
Nitrite nitrogen	--	--		
Chloride	100	52		
Hardness	130	92		
Iron	10.9	.39		
Copper	less than .1	less than .1		
Lead				
Phenolphthalein Alkalinity				
Total Alkalinity				
Manganese	1.08	less than .05		
Fluoride		.22		
Polyphosphate				
Synthetic Detergent (LAS)				
Coliform M.P.N. per 100 c.c.				
Total Coliform count per 100 ml.	less than 1	less than 1		

1-15-73
Walter Moore

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PARTS PER MILLION

NHS - DE.
6594th Inst. Sq.
Manchester, N. H. 03103

FEB 1 2 1973

Serial number	078717	078718		
Supply of or samples from: AF /PRIVATE SUPPLY	Bldg. 111 #2	Bldg. 112 #3		
Date collected	2-5-73	2-5-73		
*Turbidity	0	5		
*Sediment	2	5 iron		
*Odor	0	0		
Color	0	15		
Free ammonia nitrogen				
Alb. ammonia nitrogen				
pH	5.7	6.3		
Nitrate nitrogen	less than .1	less than .1		
Nitrite nitrogen	-------	--------		
Chloride	72.	42.		
Hardness	62	68		
Iron	.16	33.4		
Copper	less than .1	less than .1		
Lead				
Phenolphthalein Alkalinity				
Total Alkalinity				
Manganese	less than .05	1.23		
Fluoride				
Polyphosphate				
Synthetic Detergent (LAS)				
Coliform M.P.N. per 100 c.c.				
Total Coliform count per 100 ml.	less than 1	less than 1		

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PARTS PER MILLION

NHS-DE
6594th Inst. Sq.
Manchester, N. H. 03103

JUN 1 8 1973

Serial number	083262	083263		
Supply of or samples from: NEW BOSTON, NH	Bldg. 111 #2	Bldg. 112 #3		
Date collected	6-4-73	6-4-73		
*Turbidity	0	5		
*Sediment	2	5 iron		
*Odor	chlorine 1	0		
Color	0	25		
Free ammonia nitrogen				
Alb. ammonia nitrogen				
pH	6.3	6.5		
Nitrate nitrogen	.15	less than .1		
Nitrite nitrogen	-------	trace		
Chloride	82.	84		
Hardness	76	138		
Iron	.11	12.2		
Copper	less than .1	less than .1		
Lead				
Phenolphthalein Alkalinity				
Total Alkalinity				
Manganese	less than .05	.79		
Fluoride				
Polyphosphate				
Synthetic Detergent (LAS)				
Coliform M.P.N. per 100 c.c.				
Total Coliform count per 100 ml.	less than 1	less than 1		

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SANITARY WATER ANALYSIS
PARTS PER MILLION

N.H.S.D.E.
6594th Inst. Sq.
Manchester, N. H. 03103

Well #3 Well #2

Serial number	086893	086894		
Supply of or samples from: NEW BOSTON, NH	Bldg. 112	Bldg. 111		
Date collected	8/6	8/6		
*Turbidity	5	0		
*Sediment	5 iron	2		
*Odor	0	0		
Color	35	0		
Free ammonia nitrogen				
Alb. ammonia nitrogen				
pH	6.6	6.5		
Nitrate nitrogen	less than .1	.25		
Nitrite nitrogen	trace	------		
Chloride	120.	80.		
Hardness	106	62		
Iron	10.7	.2		
Copper	less than .1	less than .1		
Lead				
Phenolphthalein Alkalinity				
Total Alkalinity				
Manganese	.71	less than .05		
Fluoride				
Polyphosphate				
Synthetic Detergent (LAS)				
Coliform M.P.N. per 100 c.c.				
Total Coliform count per 100 ml.	less than 1	less than 1		

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SANITARY WATER ANALYSIS

PARTS PER MILLION

NHS DE
6594th Inst Sq
Manchester, NH 03103

NOV 1 3 1973

Serial number	#2226	#2227		
Supply of or samples from: New Boston, NH	Air Force Well #2 Bldg - 111	Air Force Well #3 Bldg - 112		
Date collected	11-5-73	11-5-73		
*Turbidity	0	5		
*Sediment				
*Odor				
Color	0	75		
Free ammonia nitrogen				
Alb. ammonia nitrogen				
pH	6.4	6.6		
Nitrate nitrogen	.3	.35		
Nitrite nitrogen	--	--		
Chloride	60.2	68.		
Hardness	66	140		
Iron	.3	9.1		
Copper	less than .1	less than .1		
Lead				
Phenolphthalein Alkalinity				
Total Alkalinity				
Manganese	less than .05	.69		
Fluoride	.17	.18		
Polyphosphate				
Synthetic Detergent (LAS)				
Coliform M.P.N. per 100 c.c.				
Total Coliform count per 100 ml.	less than 1	less than 1		

Zinc: .15

#2226: Water Turns turbid when heated.
This is due to the zinc content--
from galvanized pipes?

F. D. Houghton

F-55

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SANITARY WATER ANALYSIS

PARTS PER MILLION

NHS DE
6594th Inst Sq
Manchester, NH 03104

FEB 15 1974

Serial number	#4747	#4748	#4749	
Supply of or samples from: New Boston, NH	Bldg 111 pump #2 well faucet	Bldg 112 pump #3 well faucet	Vault #1 ? Pump faucet	
Date collected	2-6-74	2-6-74	2-6-74	
*Turbidity	0	5	0	
*Sediment				
*Odor				
Color	0	50	0	
Free ammonia nitrogen				
Alb. ammonia nitrogen				
pH	6.1	6.4	6.6	
Nitrate nitrogen	less than .1	less than .1	less than .1	
Nitrite nitrogen	Trace	Trace	--	
Chloride	98.	68.	100.	
Hardness	94	96	72	
Iron	.49	7.6	.3	
Copper	less than .1	less than .1	less than .1	
Lead				
Phenolphthalein Alkalinity				
Total Alkalinity				
Manganese	.05	1.29	less than .05	
Fluoride	.12	.13	.19	
Polyphosphate				
Synthetic Detergent (LAS)				
Coliform M.P.N. per 100 c.c.				
Total Coliform count per 100 ml.	less than 1	less than 1	less than 1	

ZINC: .15 .08

Feb. 22. 74.

Cc

H

Dick

Moore

The State of New Hampshire
Water Supply and Pollution Control Commission
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105 Loudon Road
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SANITARY WATER ANALYSIS

PARTS PER MILLION

NHS DE
6594th Inst. Sq.
Manchester, NH 03103

APR 9 1974

Serial number	#6601	#6602		
Supply of or samples from: New Boston, NH	#2 Air Force Bldg 111 well, faucet	#3 Air Force Bldg 112 well, faucet		
Date collected	4-3-74	4-3-74		
*Turbidity	0	5		
*Sediment				
*Odor				
Color	0	100		
Free ammonia nitrogen				
Alb. ammonia nitrogen				
pH	6.4	6.3		
Nitrate nitrogen	.3	.14		
Nitrite nitrogen	--	--		
Chloride	84.	42.		
Hardness	84	124		
Iron	.22	7.36		
Copper	less than .1	.1		
Lead				
Phenolphthalein Alkalinity				
Total Alkalinity				
Manganese	less than .05	1.2		
Fluoride	.15	.14		
Polyphosphate				
Synthetic Detergent (LAS)				
Coliform M.P.N. per 100 c.c.				
Total Coliform count per 100 ml.	less than 1	less than 1		

April 15-74
W. Moore

Moore

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SANITARY WATER ANALYSIS

PARTS PER MILLION

NHs De
6594th Inst. Sq.
Manchester, N.H. 03103

June 7, 1974

Serial number	8676	8677		
Supply of or samples from: Well	Pump #3 Faucet Bldg. 112	Pump #2 Faucet Bldg. 111		
Date collected	6/3/74	6/3/74		
*Turbidity	5	0		
*Sediment				
*Odor				
Color	200	0		
Free ammonia nitrogen				
Alb. ammonia nitrogen				
pH	6.3	6.2		
Nitrate nitrogen	Less than .1	Less than .1		
Nitrite nitrogen	----	---		
Chloride	110.	94.		
Hardness	120	104		
Iron	7.8	.3		
Copper	Less than .1	Less than .1		
Lead				
Phenolphthalein Alkalinity				
Total Alkalinity				
Manganese	.98	Less than .05		
Fluoride				
Polyphosphate				
Synthetic Detergent (LAS)				
Coliform M.P.N. per 100 c.c.				
Total Coliform count per 100 ml.	Less than 1	Less than 1		

Bill

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SANITARY WATER ANALYSIS
PARTS PER MILLION

NHSTS - DE
6594th Inst. Sq.
Manchester, N. H. 03103

Serial number	63864	63865		
Supply of or samples from: NEW BOSTON	Bldg. 112 well, pump, faucet #3	Bldg. 111 well, pump, faucet #2		
Date collected	4/4/72	4/4/72		
*Turbidity	0	5		
*Sediment	3	5		
*Odor	0	0		
Color	0	70		
Free ammonia nitrogen				
Alb. ammonia nitrogen				
pH	5.8	6.1		
Nitrate nitrogen	.25	.25		
Nitrite nitrogen	--	--		
Chloride	78	28		
Hardness	66	58		
Iron	less than .1	10.3		
Copper	less than .1	less than .1		
Lead				
Phenolphthalein Alkalinity				
Total Alkalinity				
Manganese	less than .05	1.49		
Fluoride				
Polyphosphate				
Synthetic Detergent (LAS)				
Coliform M.P.N. per 100 c.c.				
Total Coliform count per 100 ml.	less than 1	less than 1		

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Francis D. Houghton
~~RICHARD S. KINNIBURGH~~
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Prescott Park
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SANITARY WATER ANALYSIS

PARTS PER MILLION

New Hampshire Satellite Tracking
Station
6594th Inst. Sq.
Manchester, New Hampshire 03103

January 12, 1972

Serial number	60636	60637		
Supply of or samples from: AF/Private Supply	#2 Bldg. 111	#3 Bldg. 112		
Date collected	1/4/72	1/4/72		
*Turbidity	0	0		
*Sediment	2	5		
*Odor	0	0		
Color	0	20		
Free ammonia nitrogen				
Alb. ammonia nitrogen				
pH	6.0	6.5		
Nitrate nitrogen	.50	less than .1		
Nitrite nitrogen	---	Trace		
Chloride	63	85		
Hardness	64	142		
Iron	less than .1	12.9		
Copper	less than .1	less than .1		
Lead				
Phenolphthalein Alkalinity				
Total Alkalinity				
Manganese	less than .05	.63		
Fluoride		0.27		
Polyphosphate				
Synthetic Detergent (LAS)				
Coliform M.P.N. per 100 c.c.				
Total Coliform count per 100 ml.	1	less than 1		

SEE ATTACHED CARDS.

The State of New Hampshire
Water Supply and Pollution Control Commission
Prescott Park
105 Loudon Road
Concord 03301

Francis D. Houghton
XXXXXXXXXXXXXXXX
CHIEF OF LABORATORIES

SANITARY WATER ANALYSIS

PARTS PER MILLION

New Boston Tracking Station
New Boston
New Hampshire

November 12, 1971

Serial number	58926	58927		
Supply of or samples from:	#2 Building 111	#3 Building 112		
Date collected	11/4/71	11/4/71		
*Turbidity	2	5		
*Sediment	1	5		
*Odor	0	0		
Color	15	35		
Free ammonia nitrogen				
Alb. ammonia nitrogen				
pH	6.4	6.5		
Nitrate nitrogen	.20	.10		
Nitrite nitrogen	Trace	---		
Chloride	46	68		
Hardness	60	142		
Iron	.49	10.9		
Copper	---	.13		
Lead				
Phenolphthalein Alkalinity				
Total Alkalinity				
Manganese	---	.54		
Fluoride				
Polyphosphate				
Synthetic Detergent (LAS)				
Coliform organisms in 0.001 c.c.				
Coliform organisms in 0.01 c.c.				
Coliform organisms in 0.1 c.c.				
Coliform organisms in 1 c.c.				
Coliform organisms in 10 c.c.				
Coliform M.P.N. per 100 c.c.	less than 1	less than 1		

SEE ATTACHED CARDS.

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RICHARD S. KINNIBURGH
CHIEF OF LABORATORIES

The State of New Hampshire
Water Supply and Pollution Control Commission
Prescott Park
105 Loudon Road
Concord 03301

SANITARY WATER ANALYSIS

PARTS PER MILLION

N.H. Satellite Tracking Station
New Boston
New Hampshire

June 22, 1971

Serial number	49956	49957		
Supply of or samples from: New Boston, N.H.	#1&2 Well-pump Bldg. 107	#3 Well-pump Bldg. 112		
Date collected	6/4/71	6/4/71		
*Turbidity	0	0		
*Sediment	2	5		
*Odor	0	0		
Color	15	10		
Free ammonia nitrogen				
Alb. ammonia nitrogen				
pH	5.8	6.4		
Nitrate nitrogen	less than .1	less than .1		
Nitrite nitrogen	Very heavy	---		
Chloride	73.5	60.0		
Hardness	72	98		
Iron	less than .1	5.96		
Copper	less than .1	less than .1		
Lead				
Phenolphthalein Alkalinity				
Total Alkalinity				
Manganese	less than .05	.82		
Fluoride				
Polyphosphate				
Synthetic Detergent (LAS)				
Coliform organisms in 0.001 c.c.				
Coliform organisms in 0.01 c.c.				
Coliform organisms in 0.1 c.c.				
Coliform organisms in 1 c.c.				
Coliform organisms in 10 c.c.				
Coliform M.P.N. per 100 c.c.	less than 4.9	less than 4.9		

49956 - Satisfactory at time of collection.
49957 - Excessive iron noted at time of collection.

Richard S. Kinniburgh

The State of New Hampshire
Water Supply and Pollution Control Commission
Prescott Park
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Concord 03301

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CHIEF OF LABORATORIES

SANITARY WATER ANALYSIS

PARTS PER MILLION

N.H. Satellite Tracking Station
6594th Inst. Sqd.
Grenier Field
Manchester, N. H.

Serial number	45287	45288		
Supply of or samples from: NEW BOSTON	1+✓ Well House #107	Well House #112 #3		
Date collected	2/4/71	2/4/71		
*Turbidity	0	0		
*Sediment	3	5		
*Odor	0	0		
Color	10	20		
Free ammonia nitrogen				
Alb. ammonia nitrogen				
pH	6.2	6.3		
Nitrate nitrogen	.55	.10		
Nitrite nitrogen	Trace	--		
Chloride	63.5	50.0		
Hardness	78	108		
Iron	1.30	9.80		
Copper	.11	.24		
Lead				
Phenolphthalein Alkalinity				
Total Alkalinity				
Manganese	less than.05	.68		
Fluoride				
Polyphosphate				
Synthetic Detergent (LAS)				
Coliform organisms in 0.001 c.c.				
Coliform organisms in 0.01 c.c.				
Coliform organisms in 0.1 c.c.				
Coliform organisms in 1 c.c.				
Coliform organisms in 10 c.c.				
Coliform M.P.N. per 100 c.c.	less than4.9	less than 4.9		

Satisfactory at time of collection

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SANITARY WATER ANALYSIS

PARTS PER MILLION

N. H. Satellite Tracking Station
6594th Inst. Square
Manchester, N. H.

Serial number	41122	41123		
Supply of or samples from: New Boston	Bldg. #111 well, pump #2	Bldg. #112 pump #3		
Date collected	10/5/70	10/5/70		
*Turbidity	0	0		
*Sediment	0	5		
*Odor	0	0		
Color	10	15		
Free ammonia nitrogen				
Alb. ammonia nitrogen				
pH	6.3	6.7		
Nitrate nitrogen	.15	less than .1		
Nitrite nitrogen	--	--		
Chloride	54.0	71.5		
Hardness	53	120		
Iron	less than .1	6.25		
Copper	less than .1	less than .1		
Lead				
Phenolphthalein Alkalinity				
Total Alkalinity				
Manganese	.02	.50		
Fluoride				
Polyphosphate				
Synthetic Detergent (LAS)				
Coliform organisms in 0.001 c.c.				
Coliform organisms in 0.01 c.c.				
Coliform organisms in 0.1 c.c.				
Coliform organisms in 1 c.c.				
Coliform organisms in 10 c.c.				
Coliform M.P.N. per 100 c.c.	less than 4.0	less than 4.0		

41123 - Excessive iron noted in this sample.

Richard S. Kinniburgh

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61 South Spring Street
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ME-f

SANITARY WATER ANALYSIS
PARTS PER MILLION

N.H.S.T.S - B.C.E.
6594th Inst. Sqdn.
Grenier Air Force Base
Manchester, N. H. 03103

Apr. 13, 1970

Serial number	31331	31332		
Supply of or samples from: well - pump	well #3 Bldg. 112	well #2 Bldg. 111		
Date collected	4-3-70	same		
•Turbidity	5	0		
•Sediment	5 iron	0		
•Odor	0	0		
Color	60	20		
Free ammonia nitrogen				
Alb. ammonia nitrogen				
pH	6.1	6.2		
Nitrate nitrogen	less than 0.1	0.65		
Nitrite nitrogen	high	trace		
Chloride	65.5	38.0		
Hardness	128	52		
Iron	6.35	1.47		
Copper	less than .1	1.07		
Lead				
Phenolphthalein Alkalinity				
Total Alkalinity				
Manganese	0.20	less than .05		
Fluoride				
Polyphosphate				
Synthetic Detergent (LAS)				
Coliform organisms in 0.001 c.c.				
Coliform organisms in 0.01 c.c.				
Coliform organisms in 0.1 c.c.	neg 1	neg 1		
Coliform organisms in 1 c.c.	neg 1	neg 1		
Coliform organisms in 10 c.c.	neg 2	neg 2		
Coliform M.P.N. per 100 c.c.	less than 4.9	less than 4.9		

Satisfactory for drinking at time of collection; excessive iron noted in both samples.

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Richard S. Kinniburgh

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Water Supply and Pollution Control Commission
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SANITARY WATER ANALYSIS

PARTS PER MILLION

N.H.S.T.S. - B.C.E.
6594th Instr. Sqdn.
Grenier Air Force Base
Manchester, N. H. 03103

Mar. 13, 1970

Serial number	30289	30290		
Supply of or samples from: U.S.A.F.	#2 Bldg. 111	#3 Bldg. 112		
Date collected	3-3-70	same		
*Turbidity	0	4		
*Sediment	0	5 iron		
*Odor	0	0		
Color	15	50		
Free ammonia nitrogen				
Alb. ammonia nitrogen				
pH	5.7	6.1		
Nitrate nitrogen	0.84	0.11		
Nitrite nitrogen	-	-		
Chloride	39.0	42.0		
Hardness	60	86		
Iron	less than 0.1	2.40		
Copper	0.10	less than 0.1		
Lead				
Phenolphthalein Alkalinity				
Total Alkalinity				
Manganese	less than .05	0.97		
Fluoride				
Polyphosphate				
Synthetic Detergent (LAS)				
Coliform organisms in 0.001 c.c.				
Coliform organisms in 0.01 c.c.				
Coliform organisms in 0.1 c.c.	neg 1	neg 1		
Coliform organisms in 1 c.c.	neg 1	neg 1		
Coliform organisms in 10 c.c.	neg 2	neg 2		
Coliform M.P.N. per 100 c.c.	less than 4.9	less than 4.9		

Satisfactory at time of collection.

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SANITARY WATER ANALYSIS

PARTS PER MILLION

N.H.S.T.S. - B.C.E.
6594th Instr. Sq.
Manchester, N.H. 03103

Feb. 13, 1970

Serial number		29526	29527		
Supply of or samples from: U.S.A.F.		#2 Bldg. 111	#3 Bldg. 112		
Date collected		2-3-70	same		
*Turbidity		0	0		
*Sediment		0	0		
*Odor		0	3-chlorinous		
Color		15	35		
Free ammonia nitrogen					
Alb. ammonia nitrogen					
pH		6.3	6.9		
Nitrate nitrogen		0.65	0.10		
Nitrite nitrogen		trace	trace		
Chloride		43.5	70.0		
Hardness		86	132		
Iron		less than 0.1	1.93		
Copper		less than 0.1	less than 0.1		
Lead					
Phenolphthalein Alkalinity					
Total Alkalinity					
Manganese		less than .05	0.15		
Fluoride					
Polyphosphate					
Synthetic Detergent (LAS)					
Coliform organisms in	0.001 c.c.				
	0.01 c.c.				
	0.1 c.c.	neg 1	neg 1		
	1 c.c.	neg 1	neg 1		
	10 c.c.	neg 2	neg 2		
Coliform M.P.N. per 100 c.c.		less than 4.9	less than 4.9		

Satisfactory at time of collection.

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SANITARY WATER ANALYSIS

PARTS PER MILLION

N.H.S.T.S. - B.C.E.
6594th Inst. Sq.
Grenier Air Force Base
New Boston, N. H.

Nov. 19, 1969

Serial number	27110	27111		
Supply of or samples from: well - pump	#2 Bldg. 111	#3 Bldg. 112		
Date collected	11-6-69	same		
*Turbidity	0	0		
*Sediment	0	5 iron		
*Odor	0	5 chlorinous		
Color	5	15		
Free ammonia nitrogen				
Alb. ammonia nitrogen				
pH	6.2	6.6		
Nitrate nitrogen	0.20	less than 0.1		
Nitrite nitrogen	trace	trace		
Chloride	44.0	460.~~0~~		
Hardness	54	122		
Iron	less than 0.1	11.7		
Copper	less than 0.1	less than 0.1		
Lead				
Phenolphthalein Alkalinity				
Total Alkalinity				
Manganese	0.12	0.63		
Fluoride				
Polyphosphate				
Synthetic Detergent (LAS)				
Coliform organisms in 0.001 c.c.				
Coliform organisms in 0.01 c.c.				
Coliform organisms in 0.1 c.c.	neg 1	neg 1		
Coliform organisms in 1 c.c.	neg 1	neg 1		
Coliform organisms in 10 c.c.	neg 2	neg 2		
Coliform M.P.N. per 100 c.c.	less than 4.9	less than 4.9		

27110 - Satisfactory at time of collection.
27111 - Satisfactory at time of collection; this sample contains much chlorine and iron.

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SANITARY WATER ANALYSIS

PARTS PER MILLION

Sgt. F. C. Spohr
N.H.S.T.S. - B.C.E.
6594th Inst. Sq.
Manchester, N. H. 03103

Sept. 23, 1969

Wm L

Serial number	24854	24855		
Supply of or samples from: well - pump	FROM #3 Bldg. 127	FROM Wells #2,1 Bldg. 107		
Date collected	9-4-69	same		
*Turbidity	0	0		
*Sediment	2 iron	1		
*Odor	1 chlorine	0		
Color	2	0		
Free ammonia nitrogen				
Alb. ammonia nitrogen				
pH	7.0	7.1		
Nitrate nitrogen	0.10	0.95		
Nitrite nitrogen	-	trace		
Chloride	59.5	32.0		
Hardness	126	72		
Iron	1.71	0.80		
Copper	0.10	0.14		
Lead				
Phenolphthalein Alkalinity				
Total Alkalinity				
Manganese	0.17	less than .05		
Fluoride				
Polyphosphate				
Synthetic Detergent (LAS)				
Coliform organisms in 0.001 c.c.				
Coliform organisms in 0.01 c.c.				
Coliform organisms in 0.1 c.c.	neg 1	neg 1		
Coliform organisms in 1 c.c.	neg 1	neg 1		
Coliform organisms in 10 c.c.	neg 2	neg 2		
Coliform M.P.N. per 100 c.c.	less than 4.9	less than 4.9		

Satisfactory at time of collection.

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CHIEF OF LABORATORIES

SANITARY WATER ANALYSIS
PARTS PER MILLION

N.H.S. B.C.E.
6594th Inst. Sqdn.
Grenier Air Force Base
New Boston, N. H.

June 23, 1969

Serial number	19933	19934		
Supply of or samples from: well U.S.A.F.	well # 3 Bldg. 112	from well #4 Bldg. 107		
Date collected	6-5-69	same		
*Turbidity	0	0		
*Sediment	5 iron	4		
*Odor	1 musty	0		
Color	15	15		
Free ammonia nitrogen				
Alb. ammonia nitrogen				
pH	7.7	7.9		
Nitrate nitrogen	1.70	2.05		
Nitrite nitrogen	-	high		
Chloride	57.5	32.5		
Hardness	114	54		
Iron	8.17	2.86		
Copper	0.22	0.13		
Lead				
Phenolphthalein Alkalinity				
Total Alkalinity				
Manganese	0.13	less than .05		
Fluoride				
Polyphosphate				
Synthetic Detergent (LAS)				
Coliform organisms in 0.001 c.c.				
Coliform organisms in 0.01 c.c.				
Coliform organisms in 0.1 c.c.	neg 1	neg 1		
Coliform organisms in 1 c.c.	neg 1	neg 1		
Coliform organisms in 10 c.c.	neg 2	ne[illegible]		
[illegible] M.P.N. per 100 c.c.	less than 4.9	[illegible]an 4.9		

Re[illegible] indicated.

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Water Supply and Pollution Control Commission
61 South Spring Street
Concord
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SANITARY WATER ANALYSIS

PARTS PER MILLION

N.H.S., B.C.E.
6594th Instr. Sqdn.

Feb. 27, 1969

Serial number	16641	16642		
Supply of or samples from: well - faucet	#3 Bldg. 112	well #2 Bldg. 111		
Date collected	2-6-69	same		
*Turbidity	5	0		
*Sediment	5 iron	0		
*Odor	0	0		
Color	150	15		
Free ammonia nitrogen	less than .01	0.033		
Alb. ammonia nitrogen	less than .01	less than .01		
pH	6.9	6.4		
Nitrate nitrogen	0.15	0.65		
Nitrite nitrogen	-	-		
Chloride	48.0	37.0		
Hardness	106	40		
Iron	6.62	less than 0.1		
Copper	less than 0.1	less than 0.1		
Lead				
Phenolphthalein Alkalinity				
Total Alkalinity				
Manganese	0.40	less than .05		
Fluoride				
Polyphosphate				
Synthetic Detergent (LAS)				
Coliform organisms in 0.001 c.c.				
Coliform organisms in 0.01 c.c.				
Coliform organisms in 0.1 c.c.	neg 1	neg 1		
Coliform organisms in 1 c.c.	neg 1	neg 1		
Coliform organisms in 10 c.c.	neg 2	neg 2		
Coliform M.P.N. per 100 c.c.	less than 4.9	less than 4.9		

Satisfactory at time of collection. Excessive iron noted in the sample from Bldg. 112.

c 0 [illegible]

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61 South Spring Street
Concord
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CHIEF OF LABORATORIES

SANITARY WATER ANALYSIS

PARTS PER MILLION

New Boston Satellite Tracking Sta.
Grenier Field
Manchester, N. H.

Aug. 8, 1968

Serial number	10722	10723		
Supply of or samples from: U.S.A.F.	#2 Bldg. 111	#3 Bldg. 112		
Date collected	8-5-68	same		
*Turbidity	0	5		
*Sediment	0	5 iron		
*Odor	0	0		
Color	10	100		
Free ammonia nitrogen				
Alb. ammonia nitrogen				
pH	6.2	6.6		
Nitrate nitrogen	0.30	less than 0.1		
Nitrite nitrogen	trace	trace		
Chloride	35.5	52.5		
Hardness	48	134		
Iron	less than .1	5.36		
Copper	less than .1			
Lead				
Phenolphthalein Alkalinity				
Total Alkalinity				
Manganese				
Fluoride				
Polyphosphate				
Synthetic Detergent (LAS)				
Coliform organisms in 0.001 c.c.				
Coliform organisms in 0.01 c.c.				
Coliform organisms in 0.1 c.c.	neg 1	neg 1		
Coliform organisms in 1 c.c.	neg 1	neg 1		
Coliform organisms in 10 c.c.	neg 2	neg 2		
Coliform M.P.N. per 100 c.c.	less than 4.9	less than 4.9		

10722 - Satisfactory at time of collection.
10723 - Excessive iron noted.

Richard S. Kinniburgh

The State of New Hampshire
State Department of Health and Welfare
Concord

WILLIAM A. HEALY
Director of Sanitary Engineering

SANITARY WATER ANALYSIS

PARTS PER MILLION

FROM

Base Engineer
N. H. Tracking Station
Grenier Field, Manchester, N. H.

August 11, 1965

	1	2		
Serial number	59327	59328	59324	59325
Supply of or samples from: well	Bld 111 well #2 USAF	Bld 112 well #3	"	"
Date collected	8/6/65	"	"	"
*Turbidity	0	0		
*Sediment	1	3		
*Odor	0	Cl 4		
Color	0	5		
Free ammonia nitrogen				
Alb. ammonia "				
pH	6.3	6.7		
Nitrate nitrogen	less than 0.05	less than 0.05		
Nitrite "	--	--		
Chlorine as chloride	27.0	35.5		
Hardness	38	86		
Iron	less than 0.10	less than 0.10		
Copper				
Lead				
Phenol alkalinity				
Total "				
Manganese				
Fluoride				
Metaphosphate				
Coliform organisms in 0.01 c.c.				
Coliform organisms in 0.1 c.c.	neg. 1	neg. 1	neg. 1	neg. 1
Coliform organisms in 1 c.c.	neg. 1	neg. 1	neg. 1	neg. 1
Coliform organisms in 10 c.c.	neg. 2	neg. 2	neg. 2	neg. 2
M.P.N. B. coli per 100 c.c.	less than 4.9	less than 4.9	less than 4.9	less than 4.9

WILLIAM A. HEALY
Director of Sanitary Engineering

The State of New Hampshire
State Department of Health and Welfare
Concord

SANITARY WATER ANALYSIS
PARTS PER MILLION

FROM

Base Engineer
N. H. Tracking Sta.
Grenier Field
Manchester, N. H.

Oct. 15, 1965

Serial Number	61926	61927		
Supply of, or samples from U.S.A.F.	Bldg. 111 Well #2	Bldg. 112 Well #3		
Collected	10/11/65	same		
*Turbidity	0	0		
*Sediment	3 Fe	5 Fe		
*Odor	5 Cl_2	2 Cl_2		
Color	15	35		
Free ammonia nitrogen				
Alb. ammonia "				
Nitrate "	0.45	0.28		
Nitrite "	-	-		
Chlorine as chloride	51.0	42.5		
Hardness	52	82		
Lead				
Zinc				
Iron	1.15	4.00		
Copper				
Coliform organisms in 0.01 c. c.				
Coliform organisms in 0.1 c. c.	neg 1	neg 1		
Coliform organisms in 1 c. c.	neg 1	neg 1		
Coliform organisms in 10 c. c.	neg 2	neg 2		
Coli. organisms per 100 c. c.				
M. P. N. B. coli per 100 c. c.	less than 4.9	less than 4.9		
Bacteria per c. c. at 37° C.				
Alkalinity				
Residue on evaporation				
pH	6.5	6.5		
Free alum				

WILLIAM A. HEALY
Director of Sanitary Engineering

The State of Hampshire
State Department of Health and Welfare
Concord

SANITARY WATER ANALYSIS
PARTS PER MILLION

FROM

Base Civil Engineer
New Boston Tracking Sta.
Manchester, N. H.

Jan. 12, 1966

Serial number	63672	63674		
Supply of or samples from: U.S.A.F. FROM	Col's Coffee well #1 in Room	From well (#) #2 well Photo Lab		
Date collected	12/3/65	11/18/65		
*Turbidity	3	0		
*Sediment	3	1		
*Odor	0	0		
Color	30	0		
Free ammonia nitrogen				
Alb. ammonia "				
pH	7.9	6.7		
Nitrate nitrogen	0.17	0.17		
Nitrite "	trace	-		
Chlorine as chloride	35.0	29.5		
Hardness	90	66		
Iron	0.21	less than 0.1		
Copper	less than 0.1			
Lead				
Phenol alkalinity				
Total "				
Manganese				
Fluoride				
Metaphosphate				
Coliform organisms in 0.01 c.c.				
0.1 c.c.				
1 c.c.				
10 c.c.				
M.P.N. B. coli per 100 c.c.				

63672 - Excessive chlorides and hardness noted. We find no reason for the complaint of a bluish discoloration in the water.

63674 - Excessive chlorides and moderately high hardness noted. This may be responsible for the scum problem that you note in your photo lab.

The State of New Hampshire
State Department of Health and Welfare
Concord

WILLIAM A. HEALY
Director of Sanitary Engineering

SANITARY WATER ANALYSIS
PARTS PER MILLION

FROM

Base Engineer
New Boston Satellite Tracking Sta.
Grenier Field
Manchester, N. H.

Jan. 17, 1966

Serial number	64667	64668	64669	64670
Supply of or samples from:	Bldg. 101	Bldg. 118	Bldg. 111 Well #2	Bldg. 112 Well #3
Date collected	1/12/66	same	same	same
*Turbidity			0	1
*Sediment			0	5 Fe
*Odor			4 - Chlorine	0
Color			10	20
Free ammonia nitrogen			0.000	0.012
Alb. ammonia "			0.000	0.016
pH			6.2	6.4
Nitrate nitrogen			1.35	0.30
Nitrite "			trace	-
Chlorine as chloride			47.0	35.0
Hardness			52	94
Iron			0.10	4.70
Copper				
Lead				
Phenol alkalinity				
Total "				
Manganese				
Fluoride				
Metaphosphate				
Coliform organisms in 0.01 c.c.				
Coliform organisms in 0.1 c.c.	neg 1	neg 1	neg 1	neg 1
Coliform organisms in 1 c.c.	neg 1	neg 1	neg 1	neg 1
Coliform organisms in 10 c.c.	neg 2	neg 2	neg 2	neg 2
M.P.N. B. coli per 100 c.c.	less than 4.9	less than 4.9	less than 4.9	less than 4.[illegible]

RICHARD S. KINNIBURGH
CHIEF OF LABORATORIES

The State of N Hampshire
New Hampshire Water Pollution Commission
61 South Spring Street
Concord
03301

SANITARY WATER ANALYSIS

PARTS PER MILLION

Base Civil Engineer
New Boston Satellite Tracking Sta.

June 13, 1966

Serial number	69345	69346		
Supply of or samples from: U.S.A.F.	Bldg. 111 well #~~1~~ 5	Bldg. 112 well #~~2~~ 3		
Date collected	6/10/66	same		
*Turbidity	0	2		
*Sediment	2	4 Fe		
*Odor	0	0		
Color	0	15		
Free ammonia nitrogen				
Alb. ammonia nitrogen				
pH	6.3	6.3		
Nitrate nitrogen	0.53	less than .5		
Nitrite nitrogen	-	trace		
Chloride	35.0	25.5		
Hardness	44	70		
Iron	0.13	2.86		
Copper				
Lead				
Phenolphthalein Alkalinity				
Total Alkalinity				
Manganese				
Fluoride				
Polyphosphate				
Synthetic Detergent (LAS)				
Coliform organisms in 0.001 c.c.				
Coliform organisms in 0.01 c.c.				
Coliform organisms in 0.1 c.c.	neg 1	neg 1		
Coliform organisms in 1 c.c.	neg 1	neg 1		
Coliform organisms in 10 c.c.	neg 2	neg 2		
M.P.N. E. coli per 100 c.c.	less than 4.9	less than 4.9		

Richard S. Kinniburgh

The State of N[illegible] Hampshire
New Hampshire Water Pollution Commission
61 South Spring Street
Concord
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CHIEF OF LABORATORIES

SANITARY WATER ANALYSIS

PARTS PER MILLION

Base Civil Engineer

Sept. 16, 1966

Serial number	74510	74511		
Supply of or samples from: U.S.A.F.	#3 Bldg. 112	#2 Bldg. 111		
Date collected	9/14/66	same		
*Turbidity	5	0		
*Sediment	5 Fe	0		
*Odor	1-musty	1-chlorinous		
Color	45	0		
Free ammonia nitrogen				
Alb. ammonia nitrogen				
pH	6.7	6.[illegible]		
Nitrate nitrogen	less than .5	less than .5		
Nitrite nitrogen	-	-		
Chloride	36.5	32.5		
Hardness	100	44		
Iron	3.20	0.53		
Copper				
Lead				
Phenolphthalein Alkalinity				
Total Alkalinity				
Manganese				
Fluoride				
Polyphosphate				
Synthetic Detergent (LAS)				
Coliform organisms in 0.001 c.c.				
Coliform organisms in 0.01 c.c.				
Coliform organisms in 0.1 c.c.	[illegible]	neg 1		
Coliform organisms in 1 c.c.	[illegible]	neg 1		
Coliform organisms in 10 c.c.	neg [illegible]	neg 2		
M.P.N. E. coli per 100 c.c.	less than [illegible]	less than [illegible]		

Results as indicated.

The State of N[illegible] Hampshire
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SANITARY WATER ANALYSIS

PARTS PER MILLION

Base Civil Engineer

Nov. 22, 1966

Serial number	763[illegible]4			
Supply of or samples from: U.S.A.F.	#2 Bldg. 111			
Date collected	11-1[illegible]-66			
*Turbidity	0			
*Sediment	0			
*Odor	0			
Color	0			
Free ammonia nitrogen	0.[illegible]			
Alb. ammonia nitrogen	0.[illegible]			
pH	[illegible]			
Nitrate nitrogen	[illegible]			
Nitrite nitrogen	-			
Chloride	[illegible]			
Hardness	[illegible]			
Iron	[illegible]			
Copper				
Lead				
Phenolp[illegible]halein Alkalinity				
Total Alk[illegible]nity				
Manganese				
Fluoride				
Polyphosphate				
Synthetic Detergent (LAS)				
Coliform organisms in 0.001 c.c.				
Coliform organisms in 0.01 c.c.				
Coliform organisms in 0.1 c.c.	[illegible]			
Coliform organisms in 1 c.c.	[illegible]			
Coliform organisms in 10 c.c.	[illegible]			
M.P.N. E. coli per 100 c.c.	[illegible]			

[illegible] noted.

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SANITARY WATER ANALYSIS
PARTS PER MILLION

Base Civil Engineer
N.H. Satellite Tracking Sta.
Grenier Field
Manchester, N. H.

March 23, 1967

Serial number	79986			
Supply of or samples from: well-pump	#2 Bldg. 111			
Date collected	3-17-67			
*Turbidity	0			
*Sediment	0			
*Odor	2-chlorinous			
Color	0			
Free ammonia nitrogen	0.085			
Alb. ammonia nitrogen	0.032			
pH	5.9			
Nitrate nitrogen	1.39			
Nitrite nitrogen	-			
Chloride	45.5			
Hardness	58			
Iron	0.12			
Copper				
Lead				
Phenolphthalein Alkalinity				
Total Alkalinity				
Manganese				
Fluoride				
Polyphosphate				
Synthetic Detergent (LAS)				
Coliform organisms in 0.001 c.c.				
Coliform organisms in 0.01 c.c.				
Coliform organisms in 0.1 c.c.	neg 1			
Coliform organisms in 1 c.c.	neg 1			
Coliform organisms in 10 c.c.	neg 2			
M.P.N. E. coli per 100 c.c.	less than 4.9			

Results as indicated.

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Chief of Laboratories

SANITARY WATER ANALYSIS

PARTS PER MILLION

N. H. Satalite Tracking Sta.
Grenier A F S
Manchester, N. H. 03103

July 24, 1967

Serial number	84476	84475		
Supply of or samples from:	#2 Bldg. 111 well pump	Bldg. 112 well-faucet #3		
Date collected	7-10-67	"		
*Turbidity	0	0		
*Sediment	0	5 Fe		
*Odor	Cl2 - 3	0		
Color	0	0		
Free ammonia nitrogen				
Alb. ammonia nitrogen				
pH	6.8	7.1		
Nitrate nitrogen	1.40	.60		
Nitrite nitrogen	T	T		
Chloride	44.5	42.0		
Hardness	58	102		
Iron	.28	5.80		
Copper				
Lead				
Phenolphthalein Alkalinity				
Total Alkalinity				
Manganese				
Fluoride				
Polyphosphate				
Synthetic Detergent (LAS)				
Coliform organisms in 0.001 c.c.				
Coliform organisms in 0.01 c.c.				
Coliform organisms in 0.1 c.c.	neg. 1	neg. 1		
Coliform organisms in 1 c.c.	neg. 1	neg. 1		
Coliform organisms in 10 c.c.	neg. 2	neg. 2		
M.P.N. E. coli per 100 c.c.	less than 4.9	less than 4.9		

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Water Supply and Pollution Control Commission
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SANITARY WATER ANALYSIS
PARTS PER MILLION

6594th Inst. Sq.
N.H. Satellite Tracking Sta.
Grenier Field
Manchester, N. H.

Nov. 9, 1967

Serial number	90199	90200		
Supply of or samples from: U.S.A.F.	#2 Bldg. 111	#3 Bldg. 112		
Date collected	11-2-67	same		
*Turbidity	0	0		
*Sediment	1	5 iron		
*Odor	1musty	0		
Color	0	45		
Free ammonia nitrogen	0.470	0.623		
Alb. ammonia nitrogen	0.282	0.197		
pH	6.3	6.7		
Nitrate nitrogen	0.57	less than 0.5		
Nitrite nitrogen	-	-		
Chloride	39.0	38.5		
Hardness	62	104		
Iron	0.10	7.24		
Copper				
Lead				
Phenolphthalein Alkalinity				
Total Alkalinity				
Manganese				
Fluoride				
Polyphosphate				
Synthetic Detergent (LAS)				
Coliform organisms in 0.001 c.c.				
Coliform organisms in 0.01 c.c.				
Coliform organisms in 0.1 c.c.	neg 1	neg 1		
Coliform organisms in 1 c.c.	neg 1	neg 1		
Coliform organisms in 10 c.c.	neg 5	neg 5		
Coliform M.P.N. per 100 c.c.	less than 2	less than 2		

Results as indicated.

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SANITARY WATER ANALYSIS
PARTS PER MILLION

Base Civil Engineer
New Boston Tracking Sta.
Grenier Air Force Base
Manchester, N. H.

Feb. 15, 1968

Serial number	93025	93026		
Supply of or samples from: U.S.A.F.	#7 Bldg. 111	#3 112 ?		
Date collected	2-6-68	same		
*Turbidity	0	3		
*Sediment	0	5 iron		
*Odor	2 chlorinous	0		
Color	10	45		
Free ammonia nitrogen	0.230	0.029		
Alb. ammonia nitrogen	0.101	0.061		
pH	6.0	6.4		
Nitrate nitrogen	1.00	0.27		
Nitrite nitrogen	trace	trace		
Chloride	48.5	39.0		
Hardness	54	96		
Iron	0.35	7.00		
Copper	0.12	0.32		
Lead				
Phenolphthalein Alkalinity				
Total Alkalinity				
Manganese				
Fluoride	0.1	0.2		
Polyphosphate				
Synthetic Detergent (LAS)				
Coliform organisms in 0.001 c.c.				
Coliform organisms in 0.01 c.c.				
Coliform organisms in 0.1 c.c.	neg 1	neg 1		
Coliform organisms in 1 c.c.	neg 1	neg 1		
Coliform organisms in 10 c.c.	neg 2	neg 2		
Coliform M.P.N. per 100 c.c.	less than 4.9	less than 4.9		

Satisfactory at time of collection.

Richard S. Kinniburgh

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SANITARY WATER ANALYSIS

PARTS PER MILLION

New Boston Satellite Tracking Sta.
Grenier Air Force Base
Manchester, N. H.

April 4, 1968

Serial number	94756	94757		
Supply of or samples from: U.S.A.F.	#3 Bldg. 112	#2 Bldg. 111		
Date collected	3-28-68	same		
*Turbidity	4	0		
*Sediment	5 iron	0		
*Odor	0	1 chlorinous		
Color	40	5		
Free ammonia nitrogen	0.087	0.040		
Alb. ammonia nitrogen	0.105	0.016		
pH	6.8	6.6		
Nitrate nitrogen	0.25	0.70		
Nitrite nitrogen	trace	trace		
Chloride	41.0	48.5		
Hardness	104	142		
Iron	4.06	0.32		
Copper		0.16		
Lead				
Phenolphthalein Alkalinity				
Total Alkalinity				
Manganese	0.31	less than .05		
Fluoride	0.2	0.2		
Polyphosphate				
Synthetic Detergent (LAS)				
Coliform organisms in 0.001 c.c.				
Coliform organisms in 0.01 c.c.				
Coliform organisms in 0.1 c.c.	neg 1	neg 1		
Coliform organisms in 1 c.c.	neg 1	neg 1		
Coliform organisms in 10 c.c.	neg 2	neg 2		
Coliform M.P.N. per 100 c.c.	less than 4.9	less than 4.9		

Satisfactory at time of collection; excessive iron noted in both samples.

Richard S. Kinniburgh

C O ?-3
NAT [illegible]

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SANITARY WATER ANALYSIS

PARTS PER MILLION

New Boston Satellite Tracking Sta.
Grenier Air Force Base
Manchester, New Hampshire

June 17, 1968

Serial number		97323			
Supply of or samples from: USAF		#2 Bldg. 111			
Date collected		6-7-68			
*Turbidity		0			
*Sediment		0			
*Odor		0			
Color		5			
Free ammonia nitrogen		0.033			
Alb. ammonia nitrogen		0.033			
pH		7.1			
Nitrate nitrogen		0.57			
Nitrite nitrogen		trace			
Chloride		49.0			
Hardness		52			
Iron		less than 0.1			
Copper		less than 0.1			
Lead					
Phenolphthalein Alkalinity					
Total Alkalinity					
Manganese		0.05			
Fluoride		less than 0.1			
Polyphosphate					
Synthetic Detergent (LAS)					
Coliform organisms in	0.001 c.c.				
	0.01 c.c.				
	0.1 c.c.	neg 1			
	1 c.c.	neg 1			
	10 c.c.	neg 2			
Coliform M.P.N. per 100 c.c.		less than 4.9			

Satisfactory at time of collection.

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SANITARY WATER ANALYSIS

PARTS PER MILLION

New Boston Satellite Tracking Sta.

July 11, 1968

Serial number	98735	98736		
Supply of or samples from: U.S.A.F.	#3 Bldg. 112	#2 Bldg. 111		
Date collected	7-7-68	same		
*Turbidity	5	0		
*Sediment	5 iron	0		
*Odor	0	4-chlorinous		
Color	70	0		
Free ammonia nitrogen				
Alb. ammonia nitrogen				
pH	6.4	6.4		
Nitrate nitrogen	less than 0.1	0.45		
Nitrite nitrogen	-	trace		
Chloride	50.5	43.5		
Hardness	112	84		
Iron	3.80	less than 0.1		
Copper		less than 0.1		
Lead				
Phenolphthalein Alkalinity				
Total Alkalinity				
Manganese	0.35	less than .05		
Fluoride	0.52			
Polyphosphate				
Synthetic Detergent (LAS)				
Coliform organisms in 0.001 c.c.				
Coliform organisms in 0.01 c.c.				
Coliform organisms in 0.1 c.c.	neg 1	neg 1		
Coliform organisms in 1 c.c.	neg 1	neg 1		
Coliform organisms in 10 c.c.	neg 2	neg 2		
Coliform M.P.N. per 100 c.c.	less than 4.9	less than 4.9		

98735 - Excessive iron noted in this sample.
98736 - Satisfactory at time of collection.

Richard S. Kinniburgh

The State of New Hampshire
State Department of Health and Welfare
Concord

WILLIAM A. HEALY
Director of Sanitary Engineering

SANITARY WATER ANALYSIS
PARTS PER MILLION

FROM

Base Engineer
N. H. Tracking Sta.
Grenier Field
Manchester, N. H.

Feb. 26, 1965

Serial Number	52578	52579		
Supply of, or samples from U.S.A.F.	Well #2 Bldg. 111	Well #3 Bldg. 112		
Collected	2/9/65	same		
*Turbidity	0	0		
*Sediment	0	5 Fe		
*Odor	0	0		
Color	5	5		
Free ammonia nitrogen	0.000	0.000		
Alb. ammonia "	0.015	0.008		
Nitrate "	less than .05	less than .05		
Nitrite "	MH	-		
Chlorine as chloride	31.0	32.5		
Hardness	52	96		
Lead				
Zinc				
Iron	less than 0.1	3.94		
Copper				
Coliform organisms in 0.01 c. c.				
Coliform organisms in 0.1 c. c.	neg 1	neg 1		
Coliform organisms in 1 c. c.	neg 1	neg 1		
Coliform organisms in 10 c. c.	neg 2	neg 2		
Coli. organisms per 100 c. c.				
M. P. N. B. coli per 100 c. c.	less than 4.9	less than 4.9		
Bacteria per c. c. at 37° C.				
Alkalinity				
Residue on evaporation				
pH	7.5	7.9		
Free alum				

The State of New Hampshire
State Department of Health and Welfare
Concord

WILLIAM A. HEALY
Director of Sanitary Engineering

SANITARY WATER ANALYSIS
PARTS PER MILLION

FROM

Base Engineer
N. H. Tracking Sta.
Grenier Field
Manchester, N. H.

Jun. 28, 1965

Serial Number	51847	51848			
Supply of, or samples from U.S.A.F.	Well #2 Bldg. 111	Well #3 Bldg. 112			
Collected	1/3/65	same			
***Turbidity**	0	0			
***Sediment**	5 Fe	1			
***Odor**	0	0			
Color	5	5			
Free ammonia nitrogen	0.000	0.000			
Alb. ammonia "	---	0.022			
Nitrate "	less than .05	0.05			
Nitrite "	trace	trace			
Chlorine as chloride	35.0	22.5			
Hardness	104	40			
Lead					
Zinc					
Iron	3.50	less than 0.10			
Copper					
Coliform organisms in 0.01 c. c.					
Coliform organisms in 0.1 c. c.	neg 1	neg 1			
Coliform organisms in 1 c. c.	neg 1	neg 1			
Coliform organisms in 10 c. c.	neg 2	neg 2			
Coli. organisms per 100 c. c.					
M. P. N. B. coli per 100 c. c.	less than 4.9	less than 4.9			
Bacteria per c. c. at 37° C.					
Alkalinity					
Residue on evaporation					
pH	6.5	6.3			
Free alum					

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Director of Sanitary Engineering

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State Department of Health and Welfare
Concord

SANITARY WATER ANALYSIS
PARTS PER MILLION

FROM

Base Engineer
New Boston Tracking Station
Grenier Field
Manchester, New Hampshire

July 21, 1964

Serial Number	4507[illegible]	45076		
Supply of, or samples from	Well #2 Bldg. 111	Well #3 Bldg. 112		
Collected	6/2[illegible]/64	same		
*Turbidity	0	0		
*Sediment	0	3 Fe		
*Odor	0	0		
Color	[illegible]	15		
Free ammonia nitrogen				
Alb. ammonia "				
Nitrate "	0.0[illegible]	less than .05		
Nitrite "	trace	-		
Chlorine as chloride	25.0	22.5		
Hardness	[illegible]0	88		
Lead				
Zinc				
Iron	0.27	2.28		
Copper				
Coliform organisms in 0.01 c. c.				
Coliform organisms in 0.1 c. c.	neg 1	neg 1		
Coliform organisms in 1 c. c.	neg 1	neg 1		
Coliform organisms in 10 c. c.	neg 2	neg 2		
Coli. organisms per 100 c. c.				
M. P. N. B. coli per 100 c. c.	[illegible].9	less than [illegible].9		
Bacteria per c. c. at 37° C.				
Alkalinity				
Residue on evaporation				
pH	[illegible]	[illegible].1		
Free alum				

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Director of Sanitary Engineering

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State Department of Health and Welfare
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SANITARY WATER ANALYSIS
PARTS PER MILLION

FROM

Base Engineer
New Boston Tracking Station
Grenier Field
Manchester, New Hampshire

January 8, 1964

Serial Number	40380	40381		
Supply of, or samples from	P Bldg. 112 Well#2	P Bldg. 111 Well#3		
Collected	1/3/64	1/3/64		
*Turbidity	0	0		
*Sediment	4 Fe	1		
*Odor	0	0		
Color	0	0		
Free ammonia nitrogen				
Alb. ammonia "				
Nitrate "	less than .05	less than .05		
Nitrite "	-	-		
Chlorine as chloride	19.5	28.5		
Hardness	76	52		
Lead				
Zinc				
Iron	3.18	1.51		
Copper				
Coliform organisms in 0.01 c. c.				
Coliform organisms in 0.1 c. c.	neg 1	neg 1		
Coliform organisms in 1 c. c.	neg 1	neg 1		
Coliform organisms in 10 c. c.	neg 2	neg 2		
Coli. organisms per 100 c. c.				
M. P. N. B. coli per 100 c. c.	less than 4.9	less than 4.9		
Bacteria per c. c. at 37° C.				
Alkalinity				
Residue on evaporation				
pH	7.2	6.9		
Free alum				

William A. Healy

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Director of Sanitary Engineering

The State of New Hampshire
State Department of Health and Welfare
Concord

SANITARY WATER ANALYSIS
PARTS PER MILLION

FROM

Base Engineer
New Boston Tracking Station
Grenier Field
Manchester, N. H.

10-11-63
Cd.

November 1, 1963

Serial Number	38269	38270		
Supply of, or samples from pump	Bldg. 112 well #3	Bldg. 111 well #2		
Collected	10/11/63	10/11/63		
*Turbidity	0	0		
*Sediment	1 Fe	0		
*Odor	1 DV	1 DV		
Color	0	0		
Free ammonia nitrogen				
Alb. ammonia "				
Nitrate "	less than .05	less than .05		
Nitrite "	trace	M		
Chlorine as chloride	20.0	19.5		
Hardness	72	40		
Lead				
Zinc				
Iron	2.20	less than 0.1		
Copper				
Coliform organisms in 0.01 c. c.				
Coliform organisms in 0.1 c. c.	neg 1	neg 1		
Coliform organisms in 1 c. c.	neg 1s	neg 1		
Coliform organisms in 10 c. c.	neg 2	neg 2		
Coli. organisms per 100 c. c.				
M. P. N. B. coli per 100 c. c.	less than 4.9	less than 4.9		
Bacteria per c. c. at 37° C.				
Alkalinity				
Residue on evaporation				
pH	7.4	7.4		
Free alum				

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State Department of Health and Welfare
Concord

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Director of Sanitary Engineering

SANITARY WATER ANALYSIS
PARTS PER MILLION

FROM

B se Engineer
New Boston Tracking STation
Grenier Field
Manchester, N. H.

August 28, 1963

Serial Number	36122	36126		
Supply of, or samples from	Bldg. 111 Well #2	Bldg. 112 Well #3		
Collected	8/7/63	8/7/63		
*Turbidity	0	0		
*Sediment	0	3 Fe		
*Odor	0	0		
Color	0	0		
Free ammonia nitrogen				
Alb. ammonia "				
Nitrate "	0.05	less than 0.05		
Nitrite "	trace	trace		
Chlorine as chloride	35.0	14.0		
Hardness	36	6[illegible]		
Lead				
Zinc				
Iron	less than 0.1	1.23		
Copper				
Coliform organisms in 0.01 c. c.				
Coliform organisms in 0.1 c. c.	neg 1	neg 1		
Coliform organisms in 1 c. c.	neg 1	neg 1		
Coliform organisms in 10 c. c.	neg 2	neg 2		
Coli. organisms per 100 c. c.				
M. P. N. B. coli per 100 c. c.	less than 4.9	less than 4.9		
Bacteria per c. c. at 37° C.				
Alkalinity				
Residue on evaporation				
pH	[illegible]	6.7		
Free alum				

WILLIAM A. HEALY
Director of Sanitary Engineering

The State of New Hampshire
State Department of Health and Welfare
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SANITARY WATER ANALYSIS
PARTS PER MILLION

JUNE 3, 1963

FROM

Base Engineer
New Boston Tracking Station
Grenier Field
Manchester, N. H.

Serial Number	33607			
Supply of, or samples from well - pump -	Bldg 111 Well #2			
Collected	6/5/63			
*Turbidity	0			
*Sediment	0			
*Odor	0			
Color	0			
Free ammonia nitrogen				
Alb. ammonia "				
Nitrate "	.05			
Nitrite "	——			
Chlorine as chloride	27.0			
Hardness	36			
Lead				
Zinc				
Iron less	than .1			
Copper				
Coliform organisms in 0.01 c. c.				
Coliform organisms in 0.1 c. c.	neg. 1			
Coliform organisms in 1 c. c.	" 1			
Coliform organisms in 10 c. c.	" 2			
Coli. organisms per 100 c. c.				
M. P. N. B. coli per 100 c. c.	less than 4.3			
Bacteria per c. c. at 37° C.				
Alkalinity				
Residue on evaporation				
pH	[illegible]			
Free alum				

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EDWARD W. COLBY, M.D., M.P.H.
State Health Officer

WILLIAM A. HEALY, Director
Division of Sanitary Engineering

The State of New Hampshire
State Department of Health
Concord

SANITARY WATER ANALYSIS
PARTS PER MILLION

mar 13 63

FROM

Base Engineer
New Boston Tracking Station
Grenier Field
Manchester, N. H.

March 25, 1963

Serial Number	31439	31440		
Supply of, or samples from pump	Bldg. 112 P Well #3	Bldg. 111 Well #2 Y MAIN AREA		
Collected	3/13/63	3/13/63		
*Turbidity	0	0		
*Sediment	3 Fe	0		
*Odor	0	0		
Color	25	0		
Free ammonia nitrogen	0.002	0.002		
Alb. ammonia "	0.034	0.030		
Nitrate "	0.14	0.49		
Nitrite "	-	T		
Chlorine as chloride	11.5	23.5		
Hardness	180	140		
Lead				
Zinc				
Iron	1.20	less than 0.1		
Copper				
Coliform organisms in 0.01 c. c.				
Coliform organisms in 0.1 c. c.	neg. 1	neg. 1		
Coliform organisms in 1 c. c.	" 1	" 1		
Coliform organisms in 10 c. c.	" 5	" 2		
Coli. organisms per 100 c. c.				
M. P. N. B. coli per 100 c. c.	less than 2.0	less than 2.0		
Bacteria per c. c. at 37° C.				
Alkalinity				
Residue on evaporation				
pH	7.7	6.8		
Free alum				

31439 - 4x
31440 - 4x

EDWARD W. COLBY, M.D., M.P.H.
State Health Officer

WILLIAM A. HEALY, Director
Division of Sanitary Engineering

The State of New Hampshire
State Department of Health
Concord

SANITARY WATER ANALYSIS

PARTS PER MILLION

Jan 22 63

FROM

Base Engineer
New Boston Tracking Station
Grenier Field
Manchester, N. H.

Jan. 31, 1963

Serial Number		30506	30507		
Supply of, or samples from pump		Bldg. 111 P Pump House Well #2	Bldg. 112 P XMTR Well #3		
Collected		1/22/63	same		
*Turbidity		0	0		
*Sediment		0	2 Fe		
*Odor		0	0		
Color		0	0		
Free ammonia nitrogen		0.002	0.002		
Alb. ammonia "		0.022	0.022		
Nitrate "		0.57	0.13		
Nitrite "		-	-		
Chlorine as chloride		28.0	10.0		
Hardness		36	63		
Lead					
Zinc					
Iron		less than 0.1	1.00		
Copper					
Coliform organisms in	0.01 c. c.				
	0.1 c. c.	neg. 1	neg. 1		
	1 c. c.	" 1	" 1		
	10 c. c.	" 5	" 5		
Coli. organisms per 100 c. c.					
M. P. N. B. coli per 100 c. c.		less than 2.0	less than 2.0		
Bacteria per c. c. at 37° C.					
Alkalinity					
Residue on evaporation					
pH		6.1	6.7		
Free alum					

30506 - Excessive chlorides noted in this sample.

30507 - Excessive iron noted in this sample

EDWARD W. COLBY, M.D., M.P.H.
State Health Officer

WILLIAM A. HEALY, Director
Division of Sanitary Engineering

The State of New Hampshire
State Department of Health
Concord

SANITARY WATER ANALYSIS

PARTS PER MILLION

Nov 26, 62

FROM

Base Engineer
New Boston Tracking Station
Grenier Field
Manchester, N. H.

Dec. 7, 1962

Serial Number		29262	29263		
Supply of, or samples from		Well #2 Bldg. 111	pump Bldg. 112 Well #3		
Collected		11/26/62	same		
*Turbidity		0	0		
*Sediment		2	3 Fe		
*Odor		0	0		
Color		5	0		
Free ammonia nitrogen		0.002	0.002		
Alb. ammonia "		0.020	0.030		
Nitrate "		0.35	less than 0.05		
Nitrite "		Trace	Trace		
Chlorine as chloride		50.5	9.0		
Hardness		52	68		
Lead					
Zinc					
Iron		less than 0.1	1.38		
Copper					
Coliform organisms in	0.01 c. c.				
	0.1 c. c.	neg. 1	neg. 1		
	1 c. c.	" 1	" 1		
	10 c. c.	" 2	" 2		
Coli. organisms per 100 c. c.					
M. P. N. B. coli per 100 c. c.		less than 4.9	less than 4.9		
Bacteria per c. c. at 37° C.					
Alkalinity					
Residue on evaporation					
pH		6.4	7.7		
Free alum					

29262 - Excessive chlorides noted.

29263 - Excessive iron noted.

EDWARD W. COLBY, M.D., M.P.H.
State Health Officer

WILLIAM A. HEALY, Director
Division of Sanitary Engineering

The State of New Hampshire
State Department of Health
Concord

SANITARY WATER ANALYSIS
PARTS PER MILLION

22,62

FROM

New Boston Tracking Station
Grenier Field
Manchester, N. H.

Oct. 26, 1962

Serial Number	28445	28446		
Supply of, or samples from well-pump	Bldg. 111 Well #2	Bldg. 112 Well #3		
Collected	10/22/62	10/22/62		
*Turbidity	0	0		
*Sediment	0	3 Fe		
*Odor	0	0		
Color	0	30		
Free ammonia nitrogen	0.006	0.002		
Alb. ammonia "	0.002	0.002		
Nitrate "	0.94	0.06		
Nitrite "	T	T		
Chlorine as chloride	29.0	8.5		
Hardness	52	76		
Lead				
Zinc				
Iron	less than 0.1	3.26		
Copper				
Coliform organisms in 0.01 c. c.				
0.1 c. c.	neg. 1	neg. 1		
1 c. c.	" 1	" 1		
10 c. c.	" 5	" 5		
Coli. organisms per 100 c. c.				
M. P. N. B. coli per 100 c. c.	less than 2.0	less than 2.0		
Bacteria per c. c. at 37° C.				
Alkalinity				
Residue on evaporation				
pH	6.1	6.9		
Free alum				

28445 - Excessive chloride noted in this sample.

28446 - Excessive iron noted in this sample.

67111-14 00008

SAMPLE COLLECTION INFORMATION

7. SITE DESCRIPTION	[illegible] Bldg. 100 Worthington cooling towers
8. DATE RECEIVED BY LAB	9 Jul 80
9. DATE ANALYSIS COMPLETED	4 Aug 80
8. SITE LOCATION NO	4256420713743C2
9. FLOWRATE AT SITE 00058 GAL/MIN	unk
10. WEATHER 00041	5
11. COLLECTION DATE/PERIOD	27 June 1980
12. COLLECTOR'S NAME	Tiffany
13. SAMPLING TECHNIQUE	Grab
14. PHONE NUMBER	861-2182
15. REASON FOR SAMPLE SUBMISSION	NPDES # AF Regulations

ON-SITE ANALYTICAL RESULTS

16. WATER TEMP 00010 °C	17. PH 00400 UNITS	18. DISS O2 00300 MG/L
25	7.6	

19. RESULTS OF OTHER ON-SITE ANALYSES

ANALYSES REQUESTED AND RESULTS

911 PRESERVATION GROUP A (193)

PARAMETER	TOTAL	MG/L
Chemical Oxygen Demand	00340	25.
Total Organic CARBON as C	00680	7.
		.

PRESERVATION GROUP B

PARAMETER	TOTAL	MG/L
OIL & GREASE FREON-IR Method	00560	.

912 PRESERVATION GROUP C (194)

PARAMETER	TOTAL	MG/L
AMMONIA as N	00610	.
NITRATE as N Cd Reduct. Method	00620	.
NITRITE as N	00615	< .02
TOTAL KJELDAHL NITROGEN as N	00625	.
PHOSPHORUS Ortho PO4 as P	70507	0.5
PHOSPHORUS as P	00665	2.4

PRESERVATION GROUP D

PARAMETER	TOTAL	MG/L
CYANIDE	00720	.
CYANIDE Free, Amenable to Cl_2	00722	.

PRESERVATION GROUP E

PARAMETER	TOTAL	µG/L
PHENOLS	32730	.
		.

913 PRESERVATION GROUP A (214)

PARAMETER	DISS	TOTAL	µG/L
ARSENIC	01000	01002	<10.
BARIUM	01005	01007	<1000.
CADMIUM	01025	01027	<10.
CHROMIUM	01030	01034	400.
CHROMIUM Hexavalent		01032	<50.
COPPER	01040	01042	53.
IRON	01046	01045	2361.
LEAD	01049	01051	<50.
MANGANESE	01056	01055	100.
MERCURY	71890	71900	<.5.
NICKEL	01065	01067	<50.
SELENIUM	01145	01147	<10.
SILVER	01075	01077	<10.
ZINC	01090	01092	690.
CALCIUM as Ca	00915	00916	105.2 mg/l
MAGNESIUM as Mg	00925	00927	24.3 mg/l
POTASSIUM	00935	00937	11 mg/l
SODIUM	00930	00929	233.6 mg/l

914 PRESERVATION GROUP G (194)

PARAMETER	TOTAL	MG/L
BORON	01022	<500. µg/l
BORON, Dissolved	01020	<500. µg/l
CHLORIDE	00940	500.
COLOR	00080	25 Units
FLUORIDE	00951	.3
Residue Filterable (TDS)	00515	~~533~~ 1001.
Residue Non Filt (SS)	00530	9.
Residue	00500	1610.
Residue Volatile	00505	233.
Specific Conductance	00095	1800 µmhos
SULFATE as SO_4	00945	25.
SURFACTANTS MBAS as LAS	38260	0.2
TURBIDITY	00076	4 Units

PRESERVATION GROUP J

PARAMETER		

1. ORGANIZATION REQUESTING ANALYSIS

[illegible]

M218

CHEMIST: MAR [illegible]

REVIEWED BY: [illegible]

APPROVED BY: [illegible]

OEHL FORM NOV 76 1

NON-POTABLE WATER ANALYSIS

OEHL/Kelly 22217-22221 00008 #5 00029

SAMPLE COLLECTION INFORMATION			5. DATE RECEIVED BY LAB	6. DATE ANALYSIS COMPLETED
7. SITE DESCRIPTION: EFF From Cooling Tower & Floor Drains			23 Aug 77	6 Sept, 77
8. SITE LOCATION NO: Bldg 100	9. FLOWRATE AT SITE 00058 GAL/MIN	10. WEATHER 00041	ON-SITE ANALYTICAL RESULTS: 16. WATER TEMP 00010 °C; 17. PH 00400 UNITS; 18. DISS O2 00300 MG/L	
11. COLLECTION DATE/PERIOD: 12 Aug 77		12. COLLECTOR'S NAME	19. RESULTS OF OTHER ON-SITE ANALYSES	
13. SAMPLING TECHNIQUE		14. PHONE NUMBER		
15. REASON FOR SAMPLE SUBMISSION: NPDES				

ANALYSES REQUESTED AND RESULTS

PRESERVATION GROUP A			PRESERVATION GROUP F				PRESERVATION GROUP G		
PARAMETER	TOTAL	MG/L	PARAMETER	DISS	TOTAL	µG/L	PARAMETER	TOTAL	MG/L
Chemical Oxygen Demand	00340	54.	ARSENIC	01000	01002	.	BORON	01022	<500. µg/l
Total Organic CARBON as C	00680	.	BARIUM	01005	01007	.	BORON, Dissolved	01020	. µg/l
		.	CADMIUM	01025	01027	.	CHLORIDE	00940	272.
PRESERVATION GROUP B			CHROMIUM	01030	01034	180.	COLOR	00080	Units
PARAMETER	TOTAL	MG/L	CHROMIUM Hexavalent		01032	165.	FLUORIDE	00951	.1
OIL & GREASE FREON-IR Method	00560	.	COPPER	01040	01042	57.	Residue Filterable (TDS)	00515	665.
PRESERVATION GROUP C			IRON	01046	01045	110.	Residue Non Filt (SS)	00530	.
PARAMETER	TOTAL	MG/L	LEAD	01049	01051	.	Residue	00500	.
AMMONIA as N	00610	.	MANGANESE	01056	01055	290.	Residue Volatile	00505	.
NITRATE as N Cd Reduct. Method	00620	0.8	MERCURY	71890	71900	.	Specific Conductance	00095	µmhos
NITRITE as N	00615	<.02	NICKEL	01065	01067	.	SULFATE as SO_4	00945	17.
TOTAL KJELDAHL NITROGEN as N	00625	.	SELENIUM	01145	01147	.	SURFACTANTS MBAS as LAS	38260	.
PHOSPHORUS Ortho PO4 as P	70507	<.1	SILVER	01075	01077	.	TURBIDITY	00076	Units
PHOSPHORUS as P	00665	4.0	ZINC	01090	01092	150.	PH		7.2
PRESERVATION GROUP D			CALCIUM as Ca	00915	00916	35. mg/l	Alkalinity		*
PARAMETER	TOTAL	MG/L	MAGNESIUM as Mg	00925	00927	. mg/l			
CYANIDE	00720	<.01	POTASSIUM	00935	00937	. mg/l			
CYANIDE Free, Amenable to Cl_2	00722	.	SODIUM	00930	00929	. mg/l			
PRESERVATION GROUP E							PRESERVATION GROUP J		
PARAMETER	TOTAL	µG/L					PARAMETER		
PHENOLS	32730	.							

1. ORGANIZATION REQUESTING ANALYSIS

EBD/SGPM
Hanscom AFB MA 01731

* Sample disposed of before analysis for Alkalinity.

CHEMIST: HC MJW RGT [illegible]

REVIEWED BY

APPROVED BY: [signature]

OEHL FORM NOV 76 1 — NON-POTABLE WATER ANALYSIS

OEHL / Kelly AFB | 22212-22216 00006 | #4 00028

SAMPLE COLLECTION INFORMATION

5. DATE RECEIVED BY LAB	23 Aug 77
6. DATE ANALYSIS COMPLETED	6 Sept. 77
7. SITE DESCRIPTION	Treated water from Cooling Plant
8. SITE LOCATION NO	Bldg 100
9. FLOWRATE AT SITE 00058 GAL/MIN	
10. WEATHER 00041	
11. COLLECTION DATE/PERIOD	12 Aug 77
12. COLLECTOR'S NAME	
13. SAMPLING TECHNIQUE	
14. PHONE NUMBER	
15. REASON FOR SAMPLE SUBMISSION	NPDES #

ON-SITE ANALYTICAL RESULTS

16. WATER TEMP 00010 °C	17. PH 00400 UNITS	18. DISS O_2 00300 MG/L

19. RESULTS OF OTHER ON-SITE ANALYSES

ANALYSES REQUESTED AND RESULTS

PRESERVATION GROUP A		
PARAMETER	TOTAL	MG/L
Chemical Oxygen Demand	00340	38
Total Organic CARBON as C	00680	

PRESERVATION GROUP B		
PARAMETER	TOTAL	MG/L
OIL & GREASE FREON-IR Method	00560	

PRESERVATION GROUP C		
PARAMETER	TOTAL	MG/L
AMMONIA as N	00610	
NITRATE as N Cd Reduct. Method	00620	0.4
NITRITE as N	00615	0.09
TOTAL KJELDAHL NITROGEN as N	00625	
PHOSPHORUS Ortho PO4 as P	70507	<.1
PHOSPHORUS as P	00665	4.8

PRESERVATION GROUP D		
PARAMETER	TOTAL	MG/L
CYANIDE	00720	<.01
CYANIDE Free, Amenable to Cl_2	00722	

PRESERVATION GROUP E		
PARAMETER	TOTAL	µG/L
PHENOLS	32730	

PRESERVATION GROUP F			
PARAMETER	DISS	TOTAL	µG/L
ARSENIC	01000	01002	
BARIUM	01005	01007	
CADMIUM	01025	01027	
CHROMIUM	01030	01034	234
CHROMIUM Hexavalent		01032	230
COPPER	01040	01042	<20
IRON	01046	01045	<100
LEAD	01049	01051	
MANGANESE	01056	01055	<50
MERCURY	71890	71900	
NICKEL	01065	01067	
SELENIUM	01145	01147	
SILVER	01075	01077	
ZINC	01090	01092	130
CALCIUM as Ca	00915	00916	45. mg/l
MAGNESIUM as Mg	00925	00927	mg/l
POTASSIUM	00935	00937	mg/l
SODIUM	00930	00929	mg/l

PRESERVATION GROUP G		
PARAMETER	TOTAL	MG/L
BORON	01022	<500. µg/l
BORON, Dissolved	01020	µg/l
CHLORIDE	00940	168
COLOR	00080	Units
FLUORIDE	00951	<.1
Residue Filterable (TDS)	00515	643.
Residue Non Filt (SS)	00530	
Residue	00500	
Residue Volatile	00505	
Specific Conductance	00095	µmhos
SULFATE as SO_4	00945	11
SURFACTANTS MBAS as LAS	38260	
TURBIDITY	00076	Units
PH		7.5
Alkalinity		*

PRESERVATION GROUP J		
PARAMETER		

1. ORGANIZATION REQUESTING ANALYSIS

ESD/SGPM
Hanscom AFB, MA 01731

* Sample disposed of before analysis for alkalinity.

CHEMIST: RGH [signature] WT

REVIEWED BY

APPROVED BY [signature]

OEHL FORM NOV 76 1

NON-POTABLE WATER ANALYSIS

TABLE 1 (Continued)

HAZARD ASSESSMENT RATING METHODOLOGY GUIDELINES

II. WASTE CHARACTERISTICS

A-1 Hazardous Waste Quantity

S = Small quantity (<5 tons or 20 drums of liquid)
M = Moderate quantity (5 to 20 tons or 21 to 85 drums of liquid)
L = Large quantity (>20 tons or 85 drums of liquid)

A-2 Confidence Level of Information

C = Confirmed confidence level (minimum criteria below)

- o Verbal reports from interviewer (at least 2) or written information from the records.
- o Knowledge of types and quantities of wastes generated by shops and other areas on base.
- o Based on the above, a determination of the types and quantities of waste disposed of at the site.

S = Suspected confidence level

- o No verbal reports or conflicting verbal reports and no written information from the records.
- o Logic based on a knowledge of the types and quantities of hazardous wastes generated at the base, and a history of past waste disposal practices indicate that these wastes were disposed of at a site.

A-3 Hazard Rating

Hazard Category	Rating Scale Levels 0	1	2	3
Toxicity	Sax's Level 0	Sax's Level 1	Sax's Level 2	Sax's Level 3
Ignitability	Flash point greater than 200°F	Flash point at 140°F to 200°F	Flash point at 80°F to 140°F	Flash point less than 80°F
Radioactivity	At or below background levels	1 to 3 times background levels	3 to 5 times background levels	Over 5 times background levels

Use the highest individual rating based on toxicity, ignitability and radioactivity and determine the hazard rating.

Hazard Rating	Points
High (H)	3
Medium (M)	2
Low (L)	1

TABLE 1

HAZARD ASSESSMENT RATING METHODOLOGY GUIDELINES

I. RECEPTORS CATEGORY

Rating Factors	Rating Scale Levels 0	1	2	3	Multiplier
A. Population within 1,000 feet (includes on-base facilities)	0	1 - 25	26 - 100	Greater than 100	4
B. Distance to nearest water well	Greater than 3 miles	1 to 3 miles	3,001 feet to 1 mile	0 to 3,000 feet	10
C. Land Use/Zoning (within 1 mile radius)	Completely remote (zoning not applicable)	Agricultural	Commercial or industrial	Residential	3
D. Distance to installation boundary	Greater than 2 miles	1 to 2 miles	1,001 feet to 1 mile	0 to 1,000 feet	6
E. Critical environments (within 1 mile radius)	Not a critical environment	Natural areas	Pristine natural areas; minor wetlands; preserved areas; presence of economically important natural resources susceptible to contamination.	Major habitat of an endangered or threatened species; presence of recharge area; major wetlands.	10
F. Water quality/use designation of nearest surface water body	Agricultural or industrial use.	Recreation, propagation and management of fish and wildlife.	Shellfish propagation and harvesting.	Potable water supplies	6
G. Ground-Water use of uppermost aquifer	Not used, other sources readily available.	Commercial, industrial, or irrigation, very limited other water sources.	Drinking water, municipal water available.	Drinking water, no municipal water available; commercial, industrial, or irrigation, no other water source available.	9
H. Population served by surface water supplies within 3 miles downstream of site	0	1 - 50	51 - 1,000	Greater than 1,000	6
I. Population served by aquifer supplies within 3 miles of site	0	1 - 50	51 - 1,000	Greater than 1, 000	6

FIGURE 2 (Continued)

III. PATHWAYS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score

A. If there is evidence of migration of hazardous contaminants, assign maximum factor subscore of 100 points for direct evidence or 80 points for indirect evidence. If direct evidence exists then proceed to C. If no evidence or indirect evidence exists, proceed to B.

Subscore ______

B. Rate the migration potential for 3 potential pathways: surface water migration, flooding, and ground-water migration. Select the highest rating, and proceed to C.

1. Surface water migration

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
Distance to nearest surface water		8		
Net precipitation		6		
Surface erosion		8		
Surface permeability		6		
Rainfall intensity		8		
		Subtotals	______	______

Subscore (100 X factor score subtotal/maximum score subtotal) ______

2. Flooding

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
Flooding		1		

Subscore (100 x factor score/3) ______

3. Ground-water migration

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
Depth to ground water		8		
Net precipitation		6		
Soil permeability		8		
Subsurface flows		8		
Direct access to ground water		8		
		Subtotals	______	______

Subscore (100 x factor score subtotal/maximum score subtotal) ______

C. Highest pathway subscore.

Enter the highest subscore value from A, B-1, B-2 or B-3 above.

Pathways Subscore ______

IV. WASTE MANAGEMENT PRACTICES

A. Average the three subscores for receptors, waste characteristics, and pathways.

Receptors ______
Waste Characteristics ______
Pathways ______

Total ______ divided by 3 = ______
Gross Total Score

B. Apply factor for waste containment from waste management practices

Gross Total Score X Waste Management Practices Factor = Final Score

______ X ______ = ______

FIGURE 2

HAZARD ASSESSMENT RATING METHODOLOGY FORM

NAME OF SITE ____________________

LOCATION ____________________

DATE OF OPERATION OR OCCURRENCE ____________________

OWNER/OPERATOR ____________________

COMMENTS/DESCRIPTION ____________________

SITE RATED BY ____________________

I. RECEPTORS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
A. Population within 1,000 feet of site		4		
B. Distance to nearest well		10		
C. Land use/zoning within 1 mile radius		3		
D. Distance to reservation boundary		6		
E. Critical environments within 1 mile radius of site		10		
F. Water quality of nearest surface water body		6		
G. Ground water use of uppermost aquifer		9		
H. Population served by surface water supply within 3 miles downstream of site		6		
I. Population served by ground-water supply within 3 miles of site		6		
		Subtotals	______	______

Receptors subscore (100 X factor score subtotal/maximum score subtotal) ______

II. WASTE CHARACTERISTICS

A. Select the factor score based on the estimated quantity, the degree of hazard, and the confidence level of the information.

1. Waste quantity (S = small, M = medium, L = large) ______
2. Confidence level (C = confirmed, S = suspected) ______
3. Hazard rating (H = high, M = medium, L = low) ______

Factor Subscore A (from 20 to 100 based on factor score matrix) ______

B. Apply persistence factor
Factor Subscore A X Persistence Factor = Subscore B

______ X ______ = ______

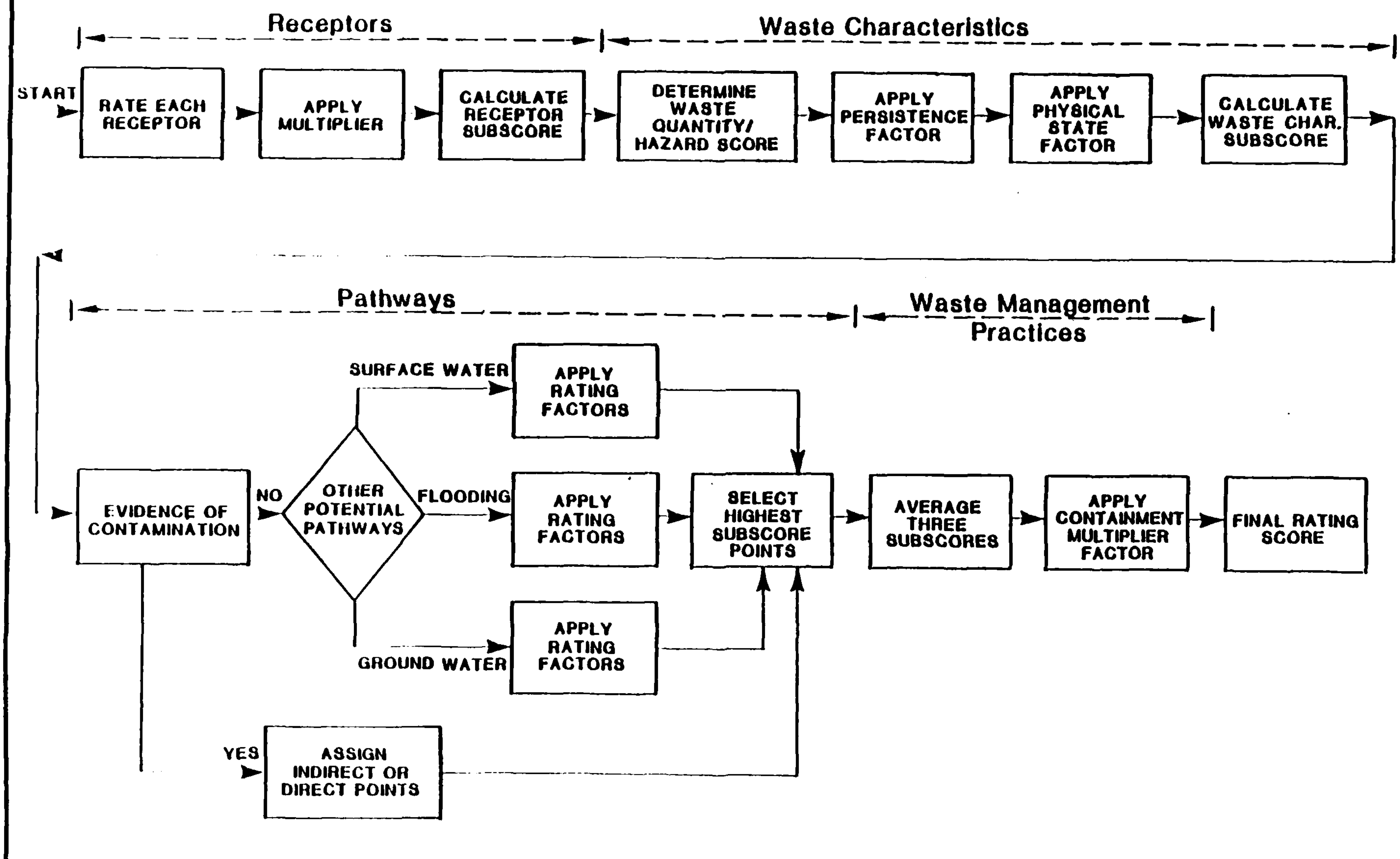
C. Apply physical state multiplier

Subscore B X Physical State Multiplier = Waste Characteristics Subscore

______ X ______ = ______

FIGURE 1

HAZARD ASSESSMENT RATING METHODOLOGY FLOW CHART



The pathways category rating is based on evidence of contaminant migration or an evaluation of the highest potential (worst case) for contaminant migration along one of three pathways. If evidence of contaminant migration exists, the category is given a subscore of 80 to 100 points. For indirect evidence, 80 points are assigned and for direct evidence 100 points are assigned. If no evidence is found, the highest score among three possible routes is used. These routes are surface water migration, flooding, and ground-water migration. Evaluation of each route involves factors associated with the particular migration route. The three pathways are evaluated and the highest score among all four of the potential scores is used.

The waste characteristics category is scored in three steps. First, a point rating is assigned based on an assessment of the waste quantity and the hazard (worst case) associated with the site. The level of confidence in the information is also factored into the assessment. Next, the score is multiplied by a waste persistence factor, which acts to reduce the score if the waste is not very persistent. Finally, the score is further modified by the physical state of the waste. Liquid wastes receive the maximum score, while scores for sludges and solids are reduced.

The scores for each of the three categories are then added together and normalized to a maximum possible score of 100. Then the waste management practice category is scored. Sites at which there is no containment are not reduced in score. Scores for sites with limited containment can be reduced by 5 percent. If a site is contained and well managed, its score can be reduced by 90 percent. The final site score is calculated by applying the waste management practices category factor to the sum of the scores for the other three categories.

PURPOSE

The purpose of the site rating model is to provide a relative ranking of sites of suspected contamination from hazardous substances. This model will assist the Air Force in setting priorities for follow-on site investigations and confirmation work under Phase II of IRP.

This rating system is used only after it has been determined that (1) potential for contamination exists (hazardous wastes present in sufficient quantity), and (2) potential for migration exists. A site can be deleted from consideration for rating on either basis.

DESCRIPTION OF MODEL

Like the other hazardous waste site ranking models, the U.S. Air Force's site rating model uses a scoring system to rank sites for priority attention. However, in developing this model, the designers incorporated some special features to meet specific DOD program needs.

The model uses data readily obtained during the Record Search portion (Phase I) of the IRP. Scoring judgments and computations are easily made. In assessing the hazards at a given site, the model develops a score based on the most likely routes of contamination and the worst hazards at the site. Sites are given low scores only if there are clearly no hazards at the site. This approach meshes well with the policy for evaluating and setting restrictions on excess DOD properties.

As with the previous model, this model considers four aspects of the hazard posed by a specific site: the possible receptors of the contamination, the waste and its characteristics, potential pathways for waste contaminant migration, and any efforts to contain the contaminants. Each of these categories contains a number of rating factors that are used in the overall hazard rating.

The receptors category rating is calculated by scoring each factor, multiplying by a factor weighting constant and adding the weighted scores to obtain a total category score.

APPENDIX G

USAF INSTALLATION RESTORATION PROGRAM
HAZARD ASSESSMENT RATING METHODOLOGY

BACKGROUND

The Department of Defense (DOD) has established a comprehensive program to identify, evaluate, and control problems associated with past disposal practices at DOD facilities. One of the actions required under this program is to:

> "develop and maintain a priority listing of contaminated installations and facilities for remedial action based on potential hazard to public health, welfare, and environmental impacts." (Reference: DEQPPM 81-5, 11 December 1981).

Accordingly, the United States Air Force (USAF) has sought to establish a system to set priorities for taking further actions at sites based upon information gathered during the Records Search phase of its Installation Restoration Program (IRP).

The first site rating model was developed in June 1981 at a meeting with representatives from USAF Occupational Environmental Health Laboratory (OEHL), Air Force Engineering Services Center (AFESC), Engineering-Science (ES) and CH_2M Hill. The basis for this model was a system developed for EPA by JRB Associates of McLean, Virginia. The JRB model was modified to meet Air Force needs.

After using this model for 6 months at over 20 Air Force installations, certain inadequacies became apparent. Therefore, on January 26 and 27, 1982, representatives of USAF OEHL, AFESC, various major commands, Engineering Science, and CH_2M Hill met to address the inadequacies. The result of the meeting was a new site rating model designed to present a better picture of the hazards posed by sites at Air Force installations. The new rating model described in this presentation is referred to as the Hazard Assessment Rating Methodology.

APPENDIX G

USAF IRP HAZARD ASSESSMENT RATING METHODOLOGY

Example Sewage Effluent Coliform Data
(1984)

Date	Effluent, MPN/100 ml-FC
12/27/84	0
12/19/84	0
12/13/84	0
12/6/84	0
11/29/84	0
11/21/84	0
11/15/84	0
11/8/84	0
11/1/84	0
10/25/84	0
10/18/84	0
10/11/84	40
10/2/84	0
9/27/84	0
9/20/84	0
9/13/84	0
9/6/84	0
8/30/84	0
8/23/84	0
8/16/84	0
8/9/84	0
8/2/84	0
7/26/84	192
7/19/84	0
7/12/84	64
7/5/84	0
6/28/84	40
6/21/84	0
6/14/84	0
6/7/84	0
5/31/84	0
5/15/84	0
5/10/84	0
5/3/84	0
4/24/84	0
4/19/84	0
4/12/84	0
4/5/84	0
4/26/84	0
3/30/84	0
3/16/84	0
3/22/84	0
3/8/84	0
3/1/84	0
2/23/84	19,300
2/16/84	0
2/9/84	40
2/2/84	0
1/26/84	284
1/19/84	0
1/12/84	0
1/5/84	900

Example Sewage Effluent Coliform Data
(1977)

Date	Fecal Coliforms, MPN/100 ml
12/30/77	0
12/22/77	14
12/15/77	0
12/8/77	1
11/23/77	1
11/17/77	0
11/3/77	4
10/27/77	6
10/20/77	TNTC
10/13/77	0
10/7/77	0
9/29/77	0
9/15/77	0
9/8/77	0
9/2/77	208
8/26/77	0
8/18/77	0
8/10/77	0
8/4/77	0
7/28/77	0
7/21/77	0
7/14/77	0
7/7/77	TNTC
6/23/77	TNTC
6/16/77	20
6/9/77	0
6/2/77	1,404
5/26/77	2
5/19/77	2,664
5/12/77	0
5/5/77	3
4/29/77	4
4/21/77	0
4/15/77	2
4/7/77	0
4/1/77	0
3/24/77	228
3/17/77	1,600
3/3/77	0
2/24/77	0
2/17/77	TNTC
2/10/77	0
2/3/77	6
1/27/77	4
1/6/77	0

ALL RESULTS ARE IN (MG/L) EXCEPT AS NOTED

	SAMPLE IDENTITY		TEST PARAMETER	RESULTS
		1360	SPEC CONDUCTNC	700
		1750	CHLORIDES	184
11	BLDG 100 TWR 1	1800	PH TOWER	6.99
		1750	CHLORIDES	184
		1360	SPEC CONDUCTNC	600
		1280	PHOSPHATE TOTAL	2
12	BLDG 100 TWR 2	1800	PH TOWER	8.21
		1750	CHLORIDES	3045
		1360	SPEC CONDUCTNC	6700
		1280	PHOSPHATE TOTAL	6
13	BLDG 100 CHIL W	1800	PH TOWER	7.44
		1750	CHLORIDES	159
		1360	SPEC CONDUCTNC	680
		1280	PHOSPHATE TOTAL	1
14	BLDG 100 DX 10	1800	PH TOWER	7.37
		1750	CHLORIDES	1079
		1360	SPEC CONDUCTNC	3300
		1280	PHOSPHATE TOTAL	4
15	BLDG 142 AIR WA	1800	PH TOWER	7.20
		1750	CHLORIDES	148
		1360	SPEC CONDUCTNC	630
		1280	PHOSPHATE TOTAL	4

****************** END ******************

CHEMSERVE Powers Street Milford, New Hampshire 03055 603 673-5440

ALL RESULTS ARE IN (MG/L) EXCEPT AS NOTED

	SAMPLE IDENTITY		TEST PARAMETER	RESULTS
		1720	P ALKALINITY	65
		1730	M ALKALINITY	140
		1740	OH ALKALINITY	0
		1760	SULFITE	4
		1790	PH BOILER	10.95
		1360	SPEC CONDUCTNC	680
		1750	CHLORIDES	113
	BLDG 106 STEAM	1710	PHOSPHATE	0
		1720	P ALKALINITY	20
		1730	M ALKALINITY	40
		1740	OH ALKALINITY	0
		1760	SULFITE	3
		1790	PH BOILER	9.69
		1360	SPEC CONDUCTNC	650
		1750	CHLORIDES	141
7	BLDG 108 HOT WA	1710	PHOSPHATE	4
		1720	P ALKALINITY	75
		1730	M ALKALINITY	110
		1740	OH ALKALINITY	40
		1760	SULFITE	0
		1790	PH BOILER	10.86
		1360	SPEC CONDUCTNC	470
		1750	CHLORIDES	63
8	BLDG 117 HOT WA	1710	PHOSPHATE	4
		1720	P ALKALINITY	0
		1730	M ALKALINITY	40
		1740	OH ALKALINITY	0
		1760	SULFITE	1
		1790	PH BOILER	7.80
		1360	SPEC CONDUCTNC	650
		1750	CHLORIDES	173
9	BLDG 118 STEAM	1710	PHOSPHATE	4
		1720	P ALKALINITY	40
		1730	M ALKALINITY	150
		1740	OH ALKALINITY	0
		1760	SULFITE	21
		1790	PH BOILER	9.80
		1360	SPEC CONDUCTNC	1000
		1750	CHLORIDES	159
10	BLDG 142 STEAM	1710	PHOSPHATE	2
		1720	P ALKALINITY	0
		1730	M ALKALINITY	40
		1740	OH ALKALINITY	0
		1760	SULFITE	1.0
		1790	PH BOILER	7.42

Chemserve

Powers Street
Milford, New Hampshire 03055
Area Code 603 673-5440

LABORATORY # 6750

All analyses performed in accordance with the requirements of the U.S.E.P.A.

Certified by: ____________________

DET 2.AFSCF/DE
N. BOSTON A.F. STATION
NEW HAMPSHIRE 03108
PERMIT #

DATE SAMPLED 8/31/81
DATE RECEIVED 8/31/81
DATE COMPLETED 9/4/81
SAMPLER R. NIEDRACH

ALL RESULTS ARE IN (MG/L) EXCEPT AS NOTED

	SAMPLE IDENTITY		TEST PARAMETER	RESULTS
1	BLDG 100 CB STE	1710	PHOSPHATE	0
		1720	P ALKALINITY	50
		1730	M ALKALINITY	210
		1740	OH ALKALINITY	0
		1760	SULFITE	17
		1790	PH BOILER	10.27
		1360	SPEC CONDUCTNC	1500
		1750	CHLORIDES	251
2	BLDG 100 VS ~~STE~~ HW	1710	PHOSPHATE	0
		1720	P ALKALINITY	250
		1730	M ALKALINITY	430
		1740	OH ALKALINITY	70
		1760	SULFITE	9
		1790	PH BOILER	9.80
		1360	SPEC CONDUCTNC	1000
		1750	CHLORIDES	226
3	BLDG 101 HOT WA	1710	PHOSPHATE	0
		1720	P ALKALINITY	0
		1730	M ALKALINITY	25
		1740	OH ALKALINITY	0
		1760	SULFITE	1.0
		1790	PH BOILER	7.58
		1360	SPEC CONDUCTNC	700
		1750	CHLORIDES	134
4	BLDG 103 HOT WA	1710	PHOSPHATE	0
		1720	P ALKALINITY	0
		1730	M ALKALINITY	30
		1740	OH ALKALINITY	0
		1760	SULFITE	1.0
		1790	PH BOILER	7.72
		1360	SPEC CONDUCTNC	730
		1750	CHLORIDES	198
5	BLDG 105-3 STEA	1710	PHOSPHATE	2

TABLE 1 (Continued)

HAZARD ASSESSMENT RATING METHODOLOGY GUIDELINES

II. WASTE CHARACTERISTICS (Continued)

Waste Characteristics Matrix

Point Rating	Hazardous Waste Quantity	Confidence Level of Information	Hazard Rating
100	L	C	H
80	L	C	M
	M	C	H
70	L	S	H
60	S	C	H
	M	C	M
50	L	S	M
	L	C	L
	M	S	H
	S	C	M
40	S	S	H
	M	S	M
	M	C	L
	L	S	L
30	S	C	L
	M	S	L
	S	S	M
20	S	S	L

Notes:
For a site with more than one hazardous waste, the waste quantities may be added using the following rules:
Confidence Level
- o Confirmed confidence levels (C) can be added
- o Suspected confidence levels (S) can be added
- o Confirmed confidence levels cannot be added with suspected confidence levels

Waste Hazard Rating
- o Wastes with the same hazard rating can be added
- o Wastes with different hazard ratings can only be added in a downgrade mode, e.g., MCM + SCH = LCM if the total quantity is greater than 20 tons.

Example: Several wastes may be present at a site, each having an MCM designation (60 points). By adding the quantities of each waste, the designation may change to LCM (80 points). In this case, the correct point rating for the waste is 80.

B. Persistence Multiplier for Point Rating

Persistence Criteria	Multiply Point Rating From Part A by the Following
Metals, polycyclic compounds, and halogenated hydrocarbons	1.0
Substituted and other ring compounds	0.9
Straight chain hydrocarbons	0.8
Easily biodegradable compounds	0.4

C. Physical State Multiplier

Physical State	Multiply Point Total From Parts A and B by the Following
Liquid	1.0
Sludge	0.75
Solid	0.50

TABLE 1 (Continued)

HAZARD ASSESSMENT RATING METHODOLOGY GUIDELINES,

III. PATHWAYS CATEGORY

A. Evidence of Contamination

Direct evidence is obtained from laboratory analyses of hazardous contaminants present above natural background levels in surface water, ground water, or air. *Evidence should confirm that the source of contamination is the site being evaluated.*

Indirect evidence might be from visual observation (i.e., leachate), vegetation stress, sludge deposits, presence of taste and odors in drinking water, or reported discharges that cannot be directly confirmed as resulting from the site, but the site is greatly suspected of being a source of contamination.

B-1 POTENTIAL FOR SURFACE WATER CONTAMINATION

Rating Factor	Rating Scale Levels 0	1	2	3	Multiplier
Distance to nearest surface water (includes drainage ditches and storm sewers)	Greater than 1 mile	2,001 feet to 1 mile	501 feet to 2,000 feet	0 to 500 feet	8
Net precipitation	Less than -10 in.	-10 to + 5 in.	+5 to +20 in.	Greater than +20 in.	6
Surface erosion	None	Slight	Moderate	Severe	8
Surface permeability	0% to 15% clay ($>10^{-2}$ cm/sec)	15% to 30% clay (10^{-2} to 10^{-4} cm/sec)	30% to 50% clay (10^{-4} to 10^{-6} cm/sec)	Greater than 50% clay ($<10^{-6}$ cm/sec)	6
Rainfall intensity based on 1 year 24-hr rainfall	<1.0 inch	1.0-2.0 inches	2.1-3.0 inches	>3.0 inches	8

B-2 POTENTIAL FOR FLOODING

Rating Factor	0	1	2	3	Multiplier
Floodplain	Beyond 100-year floodplain	In 25-year floodplain	In 10-year floodplain	Floods annually	1

B-3 POTENTIAL FOR GROUND-WATER CONTAMINATION

Rating Factor	0	1	2	3	Multiplier
Depth to ground water	Greater than 500 ft	50 to 500 feet	11 to 50 feet	0 to 10 feet	8
Net precipitation	Less than -10 in.	-10 to +5 in.	+5 to +20 in.	Greater than +20 in.	6
Soil permeability	Greater than 50% clay ($>10^{-6}$ cm/sec)	30% to 50% clay (10^{-4} to 10^{-6} cm/sec)	15% to 30% clay (10^{-2} to 10^{-4} cm/sec)	0% to 15% clay ($<10^{-2}$ cm/sec)	8
Subsurface flows	Bottom of site greater than 5 feet above high ground water level	Bottom of site occasionally submerged	Bottom of site frequently submerged	Bottom of site located below mean ground-water level	8
Direct access to ground water (through faults, fractures, faulty well casings, subsurface features, etc.)	No evidence of risk	Low risk	Moderate risk	High risk	8

TABLE 1 (Continued)

HAZARD ASSESSMENT RATING METHODOLOGY GUIDELINES

IV. WASTE MANAGEMENT PRACTICES CATEGORY

A. This category adjusts the total risk as determined from the receptors, pathways, and waste characteristics categories for waste management practices and engineering controls designed to reduce this risk. The total risk is determined by first averaging the receptors, pathways, and waste characteristics subscores.

B. WASTE MANAGEMENT PRACTICES FACTOR

The following multipliers are then applied to the total risk points (from A):

Waste Management Practice	Multiplier
No containment	1.0
Limited containment	0.95
Fully contained and in full compliance	0.10

Guidelines for fully contained:

Landfills:

- o Clay cap or other impermeable cover
- o Leachate collection system
- o Liners in good condition
- o Adequate monitoring wells

Spills:

- o Quick spill cleanup action taken
- o Contaminated soil removed
- o Soil and/or water samples confirm total cleanup of the spill

Surface Impoundments:

- o Liners in good condition
- o Sound dikes and adequate freeboard
- o Adequate monitoring wells

Fire Proection Training Areas:

- o Concrete surface and berms
- o Oil/water separator for pretreatment of runoff
- o Effluent from oil/water separator to treatment plant

General Note: If data are not available or known to be complete the factor ratings under items I-A through I, III-B-1 or III-B-3, then leave blank for calculation of factor score and maximum possible score.

APPENDIX H

HAZARD ASSESSMENT RATING METHODOLOGY FORMS

HAZARD ASSESSMENT RATING METHODOLOGY FORM

Name of Site: Landfill No. 1 (LF-1)

Location: Adjacent to pond (northeast)

Date of Operation or Occurrence: 1960-1967

Owner/Operator: USAF/BNAFS

Comments/Description: Sanitary landfill

Site Rated By: M.A. Keirn, D.F. McNeill, and D.A. Dean

I. RECEPTORS

Rating Factor	Factor Rating (0-3)	Multi-plier	Factor Score	Maximum Possible Score
A. Population within 1,000 feet of site	1	4	4	12
B. Distance to nearest well	3	10	30	30
C. Land use/zoning within 1-mile radius	0	3	0	9
D. Distance to reservation boundary	1	6	6	18
E. Critical environments within 1-mile radius of site	2	10	20	30
F. Water quality of nearest surface water body	1	6	6	18
G. Ground water use of uppermost aquifer	2	9	18	27
H. Population served by surface water supply within 3 miles downstream of site	0	6	0	18
I. Population served by ground water supply within 3 miles of site	2	6	12	18
SUBTOTALS			96	180

Receptors subscore (100 x factor score subtotal/maximum score subtotal) 53

II. WASTE CHARACTERISTICS

A. Select the factor score based on the estimated quantity, the degree of hazard, and the confidence level of the information.

1. Waste quantity (1=small, 2=medium, 3=large) 1
2. Confidence level (1=confirmed, 2=suspected) 1
3. Hazard rating (1=low, 2=medium, 3=high) 3

Factor Subscore A (from 20 to 100 based on factor score matrix) 20

B. Apply persistence factor:
Factor Subscore A x Persistence Factor = Subscore B 1 x 20 = 20

C. Apply physical state multiplier:
Subscore B x Physical State Multiplier = Waste Characteristics Subscore 1 x 20 = 20

HAZARD ASSESSMENT RATING METHODOLOGY FORM
(Continued, Page 2 of 2)

III. PATHWAYS

A. If there is evidence of migration of hazardous contaminants, assign maximum factor subscore of 100 points for direct evidence or 80 points for indirect evidence. If direct evidence exists, proceed to C. If no evidence or indirect evidence exists, proceed to B.

Subscore --

B. Rate the migration potential for three potential pathways: surface water migration, flooding, and ground water migration. Select the highest rating and proceed to C.

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
1. Surface water migration				
Distance to nearest surface water	3	8	24	24
Net precipitation	2	6	12	18
Surface erosion	0	8	0	24
Surface permeability	0	6	0	18
Rainfall intensity	1	8	8	24
SUBTOTALS			44	108
Subscore (100 x factor score subtotal/maximum score subtotal)				40
2. Flooding	2	1	2	3
Subscore (100 x factor score/3)				66
3. Ground water migration				
Depth to ground water	3	8	24	24
Net precipitation	2	6	12	18
Soil permeability	3	8	24	24
Subsurface flows	1	8	8	24
Direct access to ground water	3	8	24	24
SUBTOTALS			92	114
Subscore (100 x factor score subtotal/maximum score subtotal)				80

C. Highest pathway subscore

Enter the highest subscore value from A, B-1, B-2, or B-3 above. Pathways Subscore 80

IV. WASTE MANAGEMENT PRACTICES

A. Average the three subscores for receptors, waste characteristics, and pathways.

Receptors	53
Waste Characteristics	20
Pathways	80
TOTAL	153 divided by 3 = 51 Gross total score

B. Apply factor for waste containment from waste management practices. Gross total score x waste management practices factor = final score.

1 x 51 = 51

HAZARD ASSESSMENT RATING METHODOLOGY FORM

Name of Site: Drum storage area near Bldg. 141 (CS-1)

Location: Adjacent to Well No. 1 and Bldg. 141

Date of Operation or Occurrence: 1975-present

Owner/Operator: NBAFS/USAF

Comments/Description: 37 drums containing waste oil, paint slops, cleaning solvent, and ethylene glycol; batteries

Site Rated By: M.A. Keirn, D.F. McNeill, and D.A. Dean

I. RECEPTORS

Rating Factor	Factor Rating (0-3)	Multi-plier	Factor Score	Maximum Possible Score
A. Population within 1,000 feet of site	2	4	8	12
B. Distance to nearest well	3	10	30	30
C. Land use/zoning within 1-mile radius	2	3	6	9
D. Distance to reservation boundary	2	6	12	18
E. Critical environments within 1-mile radius of site	2	10	20	30
F. Water quality of nearest surface water body	1	6	6	18
G. Ground water use of uppermost aquifer	3	9	27	27
H. Population served by surface water supply within 3 miles downstream of site	0	6	0	18
I. Population served by ground water supply within 3 miles of site	2	6	12	18
SUBTOTALS			121	180
Receptors subscore (100 x factor score subtotal/maximum score subtotal)				67

II. WASTE CHARACTERISTICS

A. Select the factor score based on the estimated quantity, the degree of hazard, and the confidence level of the information.

1. Waste quantity (1=small, 2=medium, 3=large) 2
2. Confidence level (1=confirmed, 2=suspected) 1
3. Hazard rating (1=low, 2=medium, 3=high) 2

Factor Subscore A (from 20 to 100 based on factor score matrix) 60

B. Apply persistence factor:
Factor Subscore A x Persistence Factor = Subscore B
60 x 1.0 = 60

C. Apply physical state multiplier:
Subscore B x Physical State Multiplier = Waste Characteristics Subscore
60 x 1.0 = [illegible]

HAZARD ASSESSMENT RATING METHODOLOGY FORM
(Continued, Page 2 of 2)

III. PATHWAYS

A. If there is evidence of migration of hazardous contaminants, assign maximum factor subscore of 100 points for direct evidence or 80 points for indirect evidence. If direct evidence exists, proceed to C. If no evidence or indirect evidence exists, proceed to B.

Subscore --

B. Rate the migration potential for three potential pathways: surface water migration, flooding, and ground water migration. Select the highest rating and proceed to C.

Rating Factor	Factor Rating (0-3)	Multi-plier	Factor Score	Maximum Possible Score
1. Surface water migration				
Distance to nearest surface water	2	8	16	24
Net precipitation	2	6	12	18
Surface erosion	1	8	8	24
Surface permeability	0	6	0	18
Rainfall intensity	2	8	16	24
SUBTOTALS			52	108
Subscore (100 x factor score subtotal/ maximum score subtotal)				48
2. Flooding	0	1	0	3
Subscore (100 x factor score/3)				0
3. Ground water migration				
Depth to ground water	2	8	16	24
Net precipitation	2	6	12	18
Soil permeability	3	8	24	24
Subsurface flows	0	8	0	24
Direct access to ground water	2	8	16	24
SUBTOTALS			68	114
Subscore (100 x factor score subtotal/ maximum score subtotal)				60

C. Highest pathway subscore

Enter the highest subscore value from A, B-1, B-2, or B-3 above.

Pathways Subscore 60

IV. WASTE MANAGEMENT PRACTICES

A. Average the three subscores for receptors, waste characteristics, and pathways.

Receptors	67
Waste Characteristics	60
Pathways	60
TOTAL	187 divided by 3 = 62 Gross total score

B. Apply factor for waste containment from waste management practices. Gross total score x waste management practices factor = final score.

62 x 1.0 = 62

HAZARD ASSESSMENT RATING METHODOLOGY FORM

Name of Site: Joe English Pond Bombing Range (JEP)

Location: Central section of NBAFS

Date of Operation or Occurrence: 1940s - 1950s

Owner/Operator: NBAFS (currently); U.S. Army Air Corps (1940s - 1950s)

Comments/Description: UXO contained within sediments of lake/pond

Site Rated By: M.A. Keirn, D.F. McNeill, and D.A. Dean

I. RECEPTORS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
A. Population within 1,000 feet of site	1	4	4	12
B. Distance to nearest well	3	10	30	30
C. Land use/zoning within 1-mile radius	0	3	0	9
D. Distance to reservation boundary	1	6	6	18
E. Critical environments within 1-mile radius of site	2	10	20	30
F. Water quality of nearest surface water body	1	6	6	18
G. Ground water use of uppermost aquifer	2	9	18	27
H. Population served by surface water supply within 3 miles downstream of site	0	6	6	18
I. Population served by ground water supply within 3 miles of site	2	6	12	18
SUBTOTALS			96	180
Receptors subscore (100 x factor score subtotal/maximum score subtotal)				53

II. WASTE CHARACTERISTICS

A. Select the factor score based on the estimated quantity, the degree of hazard, and the confidence level of the information.

1. Waste quantity (1=small, 2=medium, 3=large) 1
2. Confidence level (1=confirmed, 2=suspected) 1
3. Hazard rating (1=low, 2=medium, 3=high) 3

Factor Subscore A (from 20 to 100 based on factor score matrix) 60

B. Apply persistence factor:
Factor Subscore A x Persistence Factor = Subscore B
60 x 1.0 = 60

C. Apply physical state multiplier:
Subscore B x Physical State Multiplier = Waste Characteristics Subscore
60 x 0.5 = 30

HAZARD ASSESSMENT RATING METHODOLOGY FORM
(Continued, Page 2 of 2)

III. PATHWAYS

A. If there is evidence of migration of hazardous contaminants, assign maximum factor subscore of 100 points for direct evidence or 80 points for indirect evidence. If direct evidence exists, proceed to C. If no evidence or indirect evidence exists, proceed to B.

Subscore --

B. Rate the migration potential for three potential pathways: surface water migration, flooding, and ground water migration. Select the highest rating and proceed to C.

Rating Factor	Factor Rating (0-3)	Multi-plier	Factor Score	Maximum Possible Score
1. Surface water migration				
Distance to nearest surface water	3	8	24	24
Net precipitation	2	6	12	18
Surface erosion	0	8	0	24
Surface permeability	0	6	0	18
Rainfall intensity	1	8	8	24
SUBTOTALS			44	108
Subscore (100 x factor score subtotal/maximum score subtotal)				41
2. Flooding	3	1	3	3
Subscore (100 x factor score/3)				100
3. Ground water migration				
Depth to ground water	3	8	24	24
Net precipitation	2	6	12	18
Soil permeability	3	8	24	24
Subsurface flows	3	8	24	24
Direct access to ground water	3	8	24	24
SUBTOTALS			108	114
Subscore (100 x factor score subtotal/maximum score subtotal)				95

C. **Highest pathway subscore**

Enter the highest subscore value from A, B-1, B-2, or B-3 above. Pathways Subscore 100

IV. WASTE MANAGEMENT PRACTICES

A. Average the three subscores for receptors, waste characteristics, and pathways.

Receptors	53
Waste Characteristics	30
Pathways	100
TOTAL	183 divided by 3 = 61 Gross total score

B. Apply factor for waste containment from waste management practices. Gross total score x waste management practices factor = final score.

61 x 1.0 = 61

APPENDIX I

INDEX OF REFERENCES TO POTENTIAL CONTAMINATION SOURCES

APPENDIX I

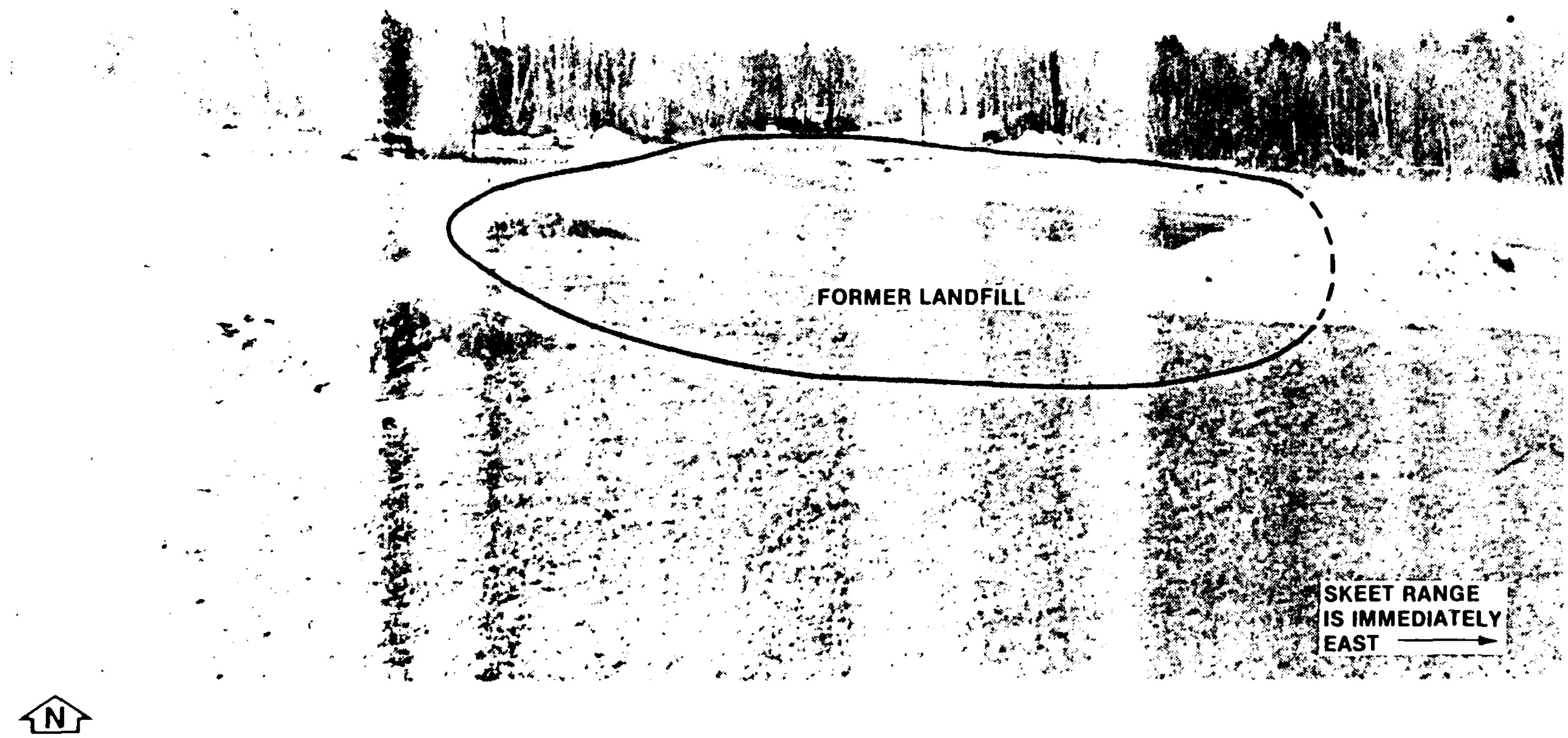
INDEX OF REFERENCES TO POTENTIAL CONTAMINATION SOURCES

Site	Designation	References (Page Numbers)
Landfill No. 1 Sec. 3.0	LF-1	Executive Summary, 7, 8, 4-2, 4-3, 4-4, 4-5, 4-7, 4-8, 4-10, 4-11 4-12, 4-25, 4-26, 4-30, 4-31, 4-32, 4-38, 4-39, 4-41, 5-2, 5-4, 6-2, 6-6, 6-7, 6-8, 6-9, 6-11, H-1, H-2, J-4
Drum Storage Area	CS-1	7, 8, 4-26, 4-30, 4-32, 4-33, 4-34, 4-38, 4-39, 4-41, 5-1, 5-2, 5-3, 6-1, 6-2, 6-3, 6-4, 6-5, 6-6, 6-11, H-3, H-4, J-3
Joe English Pond	JEP	7, 8, 9, 3-3, 3-4, 3-5, 3-9, 3-11, 3-14, 3-28, 3-30, 4-19, 4-20, 4-23, 4-24, 4-26, 4-30, 4-36, 4-37, 4-38, 4-39, 4-41, 5-2, 5-3, 5-4, 6-2, 6-6, 6-7, 6-8, 6-9, 6-11, H-5, H-6, J-1

APPENDIX J

PHOTOGRAPHS

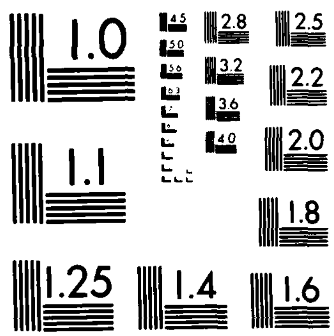
USAFNB 2 28/85



LANDFILL NO. 1 (LF-1)

INSTALLATION
RESTORATION PROGRAM
NEW BOSTON AIR FORCE STATION

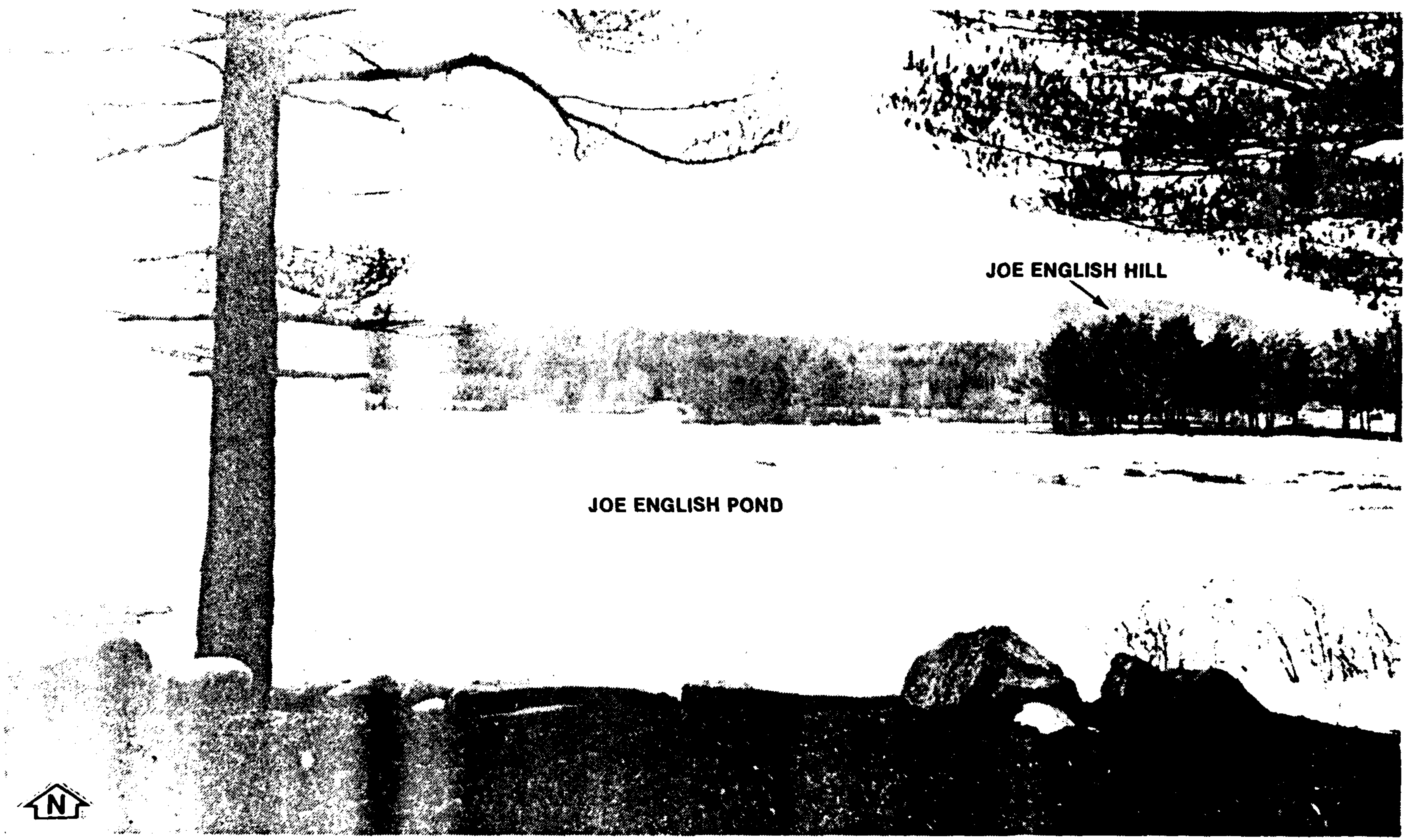
AD-A157 633 INSTALLATION RESTORATION PROGRAM PHASE I RECORDS SEARCH 4/4
NEW BOSTON AIR FO..(U) ENVIRONMENTAL SCIENCE AND
ENGINEERING INC GAINESVILLE FL M A KEIRN ET AL. JUL 85
UNCLASSIFIED SD-TR-85-32 F04701-84-C-0115 F/G 13/2 NL



MICROCOPY RESOLUTION TEST CHART

ARDS 1963 A

USAFNB 2/28/85



JOE ENGLISH POND (JEP)

INSTALLATION
RESTORATION PROGRAM
NEW BOSTON AIR FORCE STATION

USAFNB 2/28/85

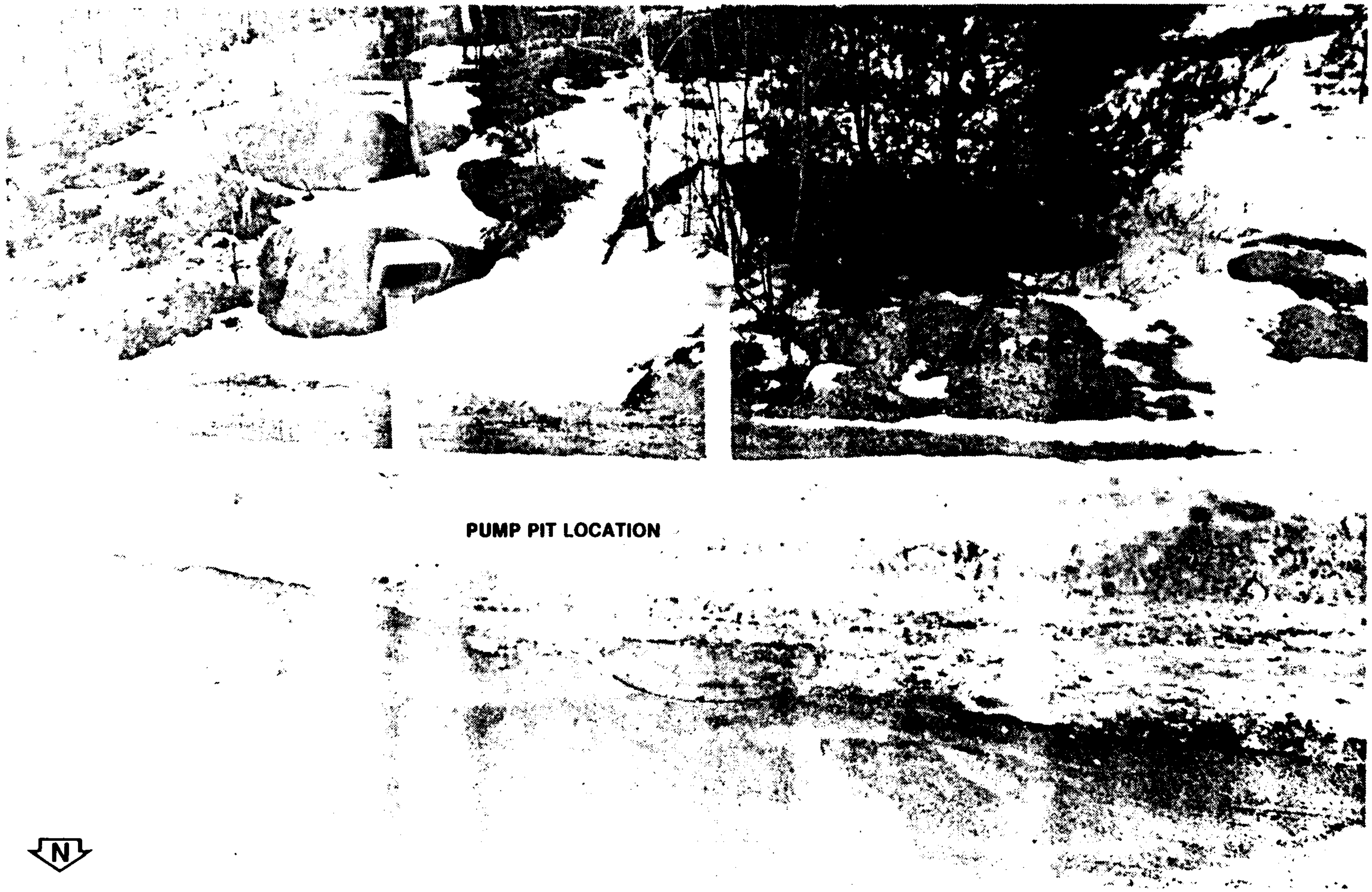
BLDG. 141 IS 300 FT
TO THE WEST →

N

DRUM STORAGE AREA
NEAR BLDG. 141 (CS-1)

INSTALLATION
RESTORATION PROGRAM
NEW BOSTON AIR FORCE STATION

USAFNB 2/28/85



WELL NO. 1,
ADJACENT TO DRUM STORAGE AREA (CS-1)

INSTALLATION
RESTORATION PROGRAM
NEW BOSTON AIR FORCE STATION

APPENDIX K

LETTER FROM NEW HAMPSHIRE DIVISION

OF PUBLIC HEALTH SERVICES

NB-54 ?? RECEIVED

DEC 1? 1984

DET 2, AFSCF/DE

STATE OF NEW HAMPSHIRE
DEPARTMENT OF HEALTH AND WELFARE
DIVISION OF PUBLIC HEALTH SERVICES

Sylvio L. Dupuis, O.D.
Commissioner
Department of Health and Welfare

William T. Wallace, Jr., M.D., M.P.H.
Director
Division of Public Health Services

Health & Welfare Bldg.
Hazen Drive
Concord, NH 03301
Tel. (603) 271-4656

December 6, 1984

Commander
Department of the Air Force
Detachment 2, AFSCF(AFSC)
New Boston Air Force Station, NH 03103

Dear Sir:

Subject: New Boston Air Force Station, NHD57009002

As a result of the inspection conducted by Division of Public Health Services, Office of Waste Management (Division) personnel on November 8, 1984, the Division has determined that the New Boston Air Force Station is not a generator of hazardous waste by current New Hampshire Standards. Division personnel spoke with civil engineers Gordon Moore and Robert Hartzo, and advised them that the Division must be notified about waste oil activities if waste oil becomes classified as a hazardous waste in the future.

On December 4, 1984, the Division submitted a recommendation to U. S. EPA, Region I that the New Boston Air Force Station should be declassified from generator status.

Sincerely,

Dawn Channing

Dawn Channing, Environmentalist
Office of Waste Management
Division of Public Health Services

DC/ldbd
cc: DB/TWN/NOT

END

FILMED

9-85

DTIC